AMERICAN GAS ASSOCIATION MONTHLY

April 1927

Volume IX Number 4

Research on Properties of Mixed Gases
By R. M. CONNER

A New Course in Fuel Engineering
By R. H. FERNALD

Getting Gas Into the Home
By J. E. DAVIES

Cincinnati Attacks Smoke at the Source
By ALVIN M. FORKNER

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Industrial Burner Ports, Manifold Pressures, and Pipe Sizes
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AMERICAN GAS ASSOCIATION MONTHLY

342 MADISON AVENUE, NEW YORK, N. Y.

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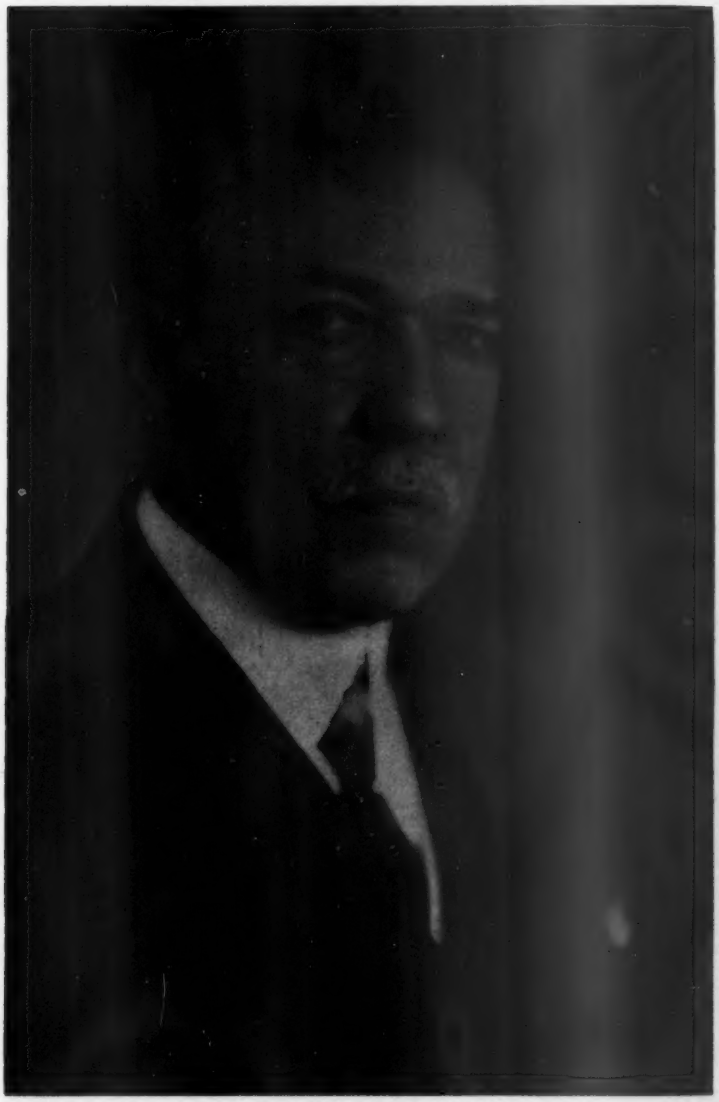
Our Own Who's Who



XXIII

James H. Jourdan

BORN Brooklyn, New York, 1864. Entered the gas business in 1882 in the street main department of the Fulton Municipal Gas Company. Became superintendent of that company in 1886. Upon the acquisition of the Fulton Municipal Company by The Brooklyn Union Gas Company became chief engineer of the Western Division of the Brooklyn Union Gas Company, and successively construction engineer, chief engineer, vice-president, and president of the company since 1914.

He is a member of the Society of Gas Lighting, the American Gas Association and many other organizations affiliated with the gas industry.

AMERICAN GAS ASSOCIATION MONTHLY

Vol. IX APRIL, 1927 No. 4

A New Course in Fuel Engineering*

The University of Pennsylvania Announces a Graduate Course of Interest and Importance

By R. H. FERNALD, M.E., Ph.D., Sc.D.

Director, Department of Mechanical Engineering, University of Pennsylvania, Philadelphia, Pa.

For the want of coal, her industries stopped,
For the want of shells, her guns were spiked,
For the want of guns, her army was powerless,
For the want of an army, her country was conquered by the Hun,
And all for the want of a few tons of coal.

R. H. Fernald

THUS ran the caption over an impressive picture in one of our newspapers relating to the desperate condition of one of the allied countries during a critical period of the late war.

The true economic importance of ample fuel resources is forcefully stated in those few lines.

Even in times of peace, our daily press and weekly journals carry significant headlines closely associating the political and economical policies of some country with the known petroleum resources of some neighboring country.

It is now generally realized that so essential are power and fuel to all manufacturing, transportation, industrial and commercial activity that the entire economic welfare of the countries of the world is dependent upon the availability and efficient utilization of power and fuel resources.

Water and fuel resources are the backbone of national prosperity. Correspondingly essential are power and fuel for the comforts of our daily home life.

Of all the countries of the world, the United States was originally most lavishly endowed with fuel—wood, coal, oil, and natural gas—but this very overabundant supply has been, directly or indirectly, the basic cause of unbelievable waste and reckless extravagance.

The burning of sawmill refuse and edgings day and night throughout the year, the discarding with the ashes of 25 per cent to 33 per cent of the original coal fired, the throwing away of large portions of the oil supply as a drug on the market, the blowing of natural gas into the air as a nuisance in oil production, and the reckless burning in the open gas fields of billions of cubic feet are all well within our present recollection.

The worthless edgings of two generations ago now bring from $10 to $15 a cord. The $1 and $1.50 coal of the same period, too cheap at that time to warrant economy in its use, now sells for from

*A one year's graduate course leading to the degree of Master of Science in Fuel Engineering. For information address Dean John Frazer, Towne Scientific School, University of Pennsylvania, Philadelphia, Pa.

$5 to $15 a ton and the annoying gas and useless oil products, now worth millions annually, are so nearly exhausted that great anxiety is felt as to the possibility of substitutes to meet the ever increasing industrial and domestic demand.

Faulty mining methods and the low cost of coal have, in years past, resulted in a wastage of a ton and a half for every ton placed on the commercial market. Our general procedure has resulted in the flooding and caving of mines from which only the better grades of coal have been taken and the breaking up of the seams, thus making the removal of the coal by future generations not only expensive but so dangerous as to be prohibitive.

When natural gas was first used, tremendous quantities were lost through inability to cope with high pressures when the reservoirs were tapped. Vast quantities have been wasted through the indifference of those interested in securing petroleum, but not concerned about natural gas, and the gas from the wells has been purged in order to get the oil. As great as have been the losses from these two sources, a far greater loss has resulted from burning wells. Hundreds of millions of cubic feet have thus been destroyed daily. One well blew forth wasted gas to the aggregate value of $3,000,000.

For years the waste in the gas fields was equal to the amount utilized, and frequently reached the equivalent of the loss annually of over 20,000,000 tons of coal, or the destruction of a 40-ton car of coal every minute of every 24-hour day for the year.

This ruthless waste of our wonderful fuel resources, the unrestricted use of our better grade fuels, and the neglect to use fuels that should be of real commercial value are phases of our national extravagances that are little short of appalling.

The water power resources of the United States are large but it must not be forgotten that when all these resources have been harnessed the total available water power will be not over seven or eight per cent of the total power demand.

Our principal dependence for power, light and heat must, therefore, be placed on fuel, solid, liquid and gaseous.

Even though plant efficiencies have been steadily improving and have been raised from 10 per cent overall thermal efficiency for the finest central steam stations of twenty years ago to 21 per cent for such stations to-day, the fuel cost for such stations is enormous, averaging from 75 to 92 per cent of the total daily station cost and amounting roughly to $1,000,000 annually for each 35,000 kw. turbo-generator unit.

The expenditure of hundreds of thousands of dollars is surely warranted in an effort to reduce this annual fuel bill some 25 per cent by utilizing steam of much higher pressure.

The near exhaustion of our petroleum supply, with its spectacular influence upon the automotive industry, calls for prompt action—whether through the distillation of our oil shales or through the reduction of coal to a liquid state by the process recently described by leading German Chemists is yet to be determined.

The complete failure of the natural gas supply in many sections of the country and the unquestionable exhaustion of this entire resource in the near future calls for an exhaustive study of the entire situation and a determination of the economic fields for producer gas, coke oven gas, so-called illuminating gas and other gases that may result from further research.

The domestic heating problem with its dirt, smoke, ash handling and general furnace nuisance is ripe for a solution in keeping with the comforts of the present day. What investigations in this field may develop is conjecture, but the trend of the not distant future seems to be toward district steam or hot water heating and heating by the use of gas as fuel in the private home.

The insistent demand for fuel engineers, with a clear understanding of the character and relative value of our fuel

Towne Scientific School at the University of Pennsylvania

resources, with a comprehension of the complex combustion and utilization problems of the several types of industry, with a vision and perspective that shall enable them to keep pace with the ever increasing efficiencies and economies of new but sound developments, calls for a comprehensive, practical graduate course which presents to the student not only past and present practice, but the probable future trend.

Such a course must be largely presented by experts connected with the many interests that are producing and using fuels.

The University of Pennsylvania course in fuel engineering has been organized to meet this requirement and invitations have been extended to forty-five nationally recognized authorities to participate in making this course thoroughly practical and authoritative, including state and national geologists, consulting engineers, practical fuel and mining experts, consulting chemists, economists, and transportation experts.

The course embraces:

A. Fuel Resources
B. Mining Methods: Preparation for Market; Distribution; Storage and Re-handling
C. Composition and Combustion of Fuels
D. Manufacture of Special Fuels
E. Uses of Fuels and Specifications for Purchase
F. Furnaces
G. Fuel Sampling; Analysis and Calorimetry
H. Fuel Testing in Heating and Power Appliances
I. Domestic Heating; Cooking; Smoke Elimination
J. Regulations Affecting Use of Water Power and of Fuel Resources
K. Research
L. Electives

The splendid cooperation of the various industries is clearly shown by the marked assistance of the Committee on Cooperation with Educational Institutions of the American Gas Association and the splendid response of the individual members who have accepted the invitation of the Towne Scientific School, University of Pennsylvania, to be "guest lecturers" for the university year 1927-28.

Among the special lectures to be given by members of the American Gas Association are the following:

Economics of Gas Manufacture, by F. C. Weber, gas engineer, Henry L. Doherty Company, New York.

Coal Gas—Retort, by J. P. Haftenkamp, general superintendent, Rochester Gas & Electric Corporation, Rochester, N. Y.

Coal Gas—Coke Oven, by E. H. Bauer, manager, Worcester Gas Light Co., Worcester, Mass.

Water Gas—Standard Practice, by W. H. Fulweiler, chemical engineer, The United Gas Improvement Co., Philadelphia, Pa.

Water Gas—Recent Modifications, by W. H. Fulweiler.

Condensing and Scrubbing, by F. W. Steere, vice-president, Steere Engineering Company, New York.

Purification and By-Products, by F. W. Sperr, Jr., chief chemist, The Koppers Company, Pittsburgh, Pa.

Storage and Metering, by A. I. Snyder, engineer, Detroit City Gas Company, Detroit, Mich.

Economics of Gas Distribution, by R. G. Griswold, chemical technologist, Henry L. Doherty Company, New York.

Distribution—High Pressure, by R. C. Cornish, engineer, The United Gas Improvement Company, Philadelphia, Pa.

(Continued on page 248)

P. H. Gadsden Renominated for Director of United States Chamber of Commerce

Cooperation is Requested to Assure His Election at Meeting to Be Held May 2 to 5

P. H. Gadsden

PHILIP H. GADSDEN, vice-president of The United Gas Improvement Company, Philadelphia, Pa., has been nominated for election to the Board of Directors of the Chamber of Commerce of the United States. Mr. Gadsden has served as a director of the organization for the last four years, being the able representative of the public utility industry. His nomination this year is recognition of his service to the national body, and the entire utility industry is united to give fullest support to assure his reelection.

Mr. Gadsden, a well-known figure in the gas industry, has devoted much of his time to the work of the Chamber of Commerce. His qualifications eminently fit him as a director of the National body. He is now President of the Philadelphia, Pa., Chamber, and a director of the Pennsylvania State organization. He is also a member of a number of important committees of the U. S. Chamber of Commerce.

He is a director of the American Gas Association. In addition he has served as President of the following organizations in recent years: American Electric Railway Association, Eastern States Gas Conference, and the Southern Gas Association. He is also a member of the Joint Committee of National Associations and is chairman of the A. G. A. Commission on Asphyxiation and Resuscitation.

Mr. Gadsden has been proposed for nomination as the Director representing District 2. The election of 17 directors to serve a two-year term will be held at the annual meeting of the Chamber in Washington, D. C., May 2 to 5.

There is keen competition in the election of a director of the Chamber of Commerce of the United States and to secure the election of any person the utmost activity is essential. The cooperation of all member gas companies and all individual members of the American Gas Association is urgently requested in support of Mr. Gadsden. The Association has suggested to all members the advisability of taking the matter up with the local chambers or similar organizations with which they have contact to arrange, if possible, for the support of the national councillor in electing Mr. Gadsden.

Research on Properties of Mixed Gases

Proposed Plan of Work To Be Done by the A. G. A. Testing Laboratory at Cleveland

By R. M. CONNER
Director, Testing Laboratory, American Gas Association

R. M. Conner

ONE of the most vital problems confronting the gas industry today is that of mixing gases of different specific gravities and different heating values so that a gas of sufficiently uniform quality will be secured for satisfactory appliance operation. In many cities it is more economical and in others a necessity to mix gases. Generally speaking there are four conditions existing which may require the mixing of gases. The natural gas supply in certain territories is rapidly decreasing which means companies affected must either serve straight manufactured gas or mix natural and a manufactured gas until the supply of natural gas is depleted.

In the manufactured gas industry where there is a desire to lower the heating value, this is sometimes obtained by mixing with the base gas, coal gas or carburetted water gas or some other gas of a lower heating value. By-product coke oven gas can often be obtained from the iron and steel mills at a much cheaper rate than gas companies can manufacture it. However, the supply is usually smaller than the demand and is generally seasonal, so that the gas companies are forced to mix with it some other base gas such as coal gas, water gas, carburetted water gas or oil gas to meet peak load demands. Under these conditions the heating value generally remains about the same.

Oil gas manufacture is somewhat limited because of the decrease in supply of oil and its increasing cost. Therefore, oil gas must be either supplanted by a gas from coal or mixed with another gas such as coal, coke oven or water gas.

If the policy of mixing gases is an economic necessity then there are a number of basic questions that must be answered before gases can be mixed correctly and satisfactory service maintained to the customer. The most important of these are as follows:

1. How large a variation in specific gravity can be tolerated, the heating value remaining constant without changing the adjustment of common types of appliances and still secure satisfactory operation?

2. With the specific gravity remaining constant, how great a variation in heating value can be accommodated without changing the adjustment of the appliance?

3. How great can variations in pressure with changes in gravity or heating value be and yet secure satisfactory appliance performance?

4. How far can the gas companies go in varying both specific gravities and heating values before difficulties in the operation of appliances are encountered?

Summarizing the above four questions briefly, if the gas supply is changed, will it be necessary to readjust all the appliances already in service and how much can a gas supply be varied without readjusting all the appliances? A change in adjustment of all appliances would incur a tremendous expense.

Realizing the necessity of some impartial and authentic information on this subject, the Managing Committee of the Testing Laboratory under the leadership of R. W. Gallagher, President of the East Ohio Gas Company, and the Sub-Com-

mittee on Mixed Gas Research of which F. C. Weber, of Henry L. Doherty & Company, is Chairman, have agreed that the logical place to conduct such an investigation is at the A. G. A. Testing Laboratory in Cleveland. Mr. Weber's committee is under the general direction of the Technical Section of the American Gas Association of which W. C. Beckjord of the American Light & Traction Company of New York is Chairman, and the Committee on Engineering and Economic Survey, with H. E. Bates of The Peoples Gas Light & Coke Company of Chicago, as Chairman.

The Laboratory is particularly fortunate in being located where so many basic gases are available. Through the generosity of the East Ohio Gas Company, certain other facilities such as large storage holders, purifying boxes, carburetted water gas machines and laboratory space shown by the accompanying drawing have been provided which will materially reduce the cost of the investigation. The use of the 800,000 cu.ft. holder No. 1 and the 150,000 cu.ft. holder No. 5 has been granted by the East Ohio Gas Company. The Testing Laboratory will have to install a three-inch pipe line from holder No. 1 to holder No. 2, a three-inch natural gas line to holder No. 2, a three-inch coke oven gas and a three-inch water gas line to holder No. 2, and a three-inch pipe line for mixed gases from holder No. 2 to the Laboratory. This makes a total of roughly 1400 ft. of additional mains. It will also be necessary to install a new holder (No. 2) which is now being erected and some of the piping has also been laid.

Actual testing work will probably begin about April 15th. Experiments will be conducted on the more common types of domestic and industrial appliances. The tentative list is as follows:

3 gas ranges with different types of burners
3 space heaters with different burners
3 water heaters (2 automatic, 1 instantaneous)
1 gas-fired boiler
3 industrial appliances (1 cutting torch, 1 rivet heater, 1 bake oven)

In so far as possible only approved types of appliances will be used and pressure variations will be the same as those prescribed for each appliance in the A. G. A. Approval Requirements.

On each appliance the following tests are to be made on all mixtures of gases:

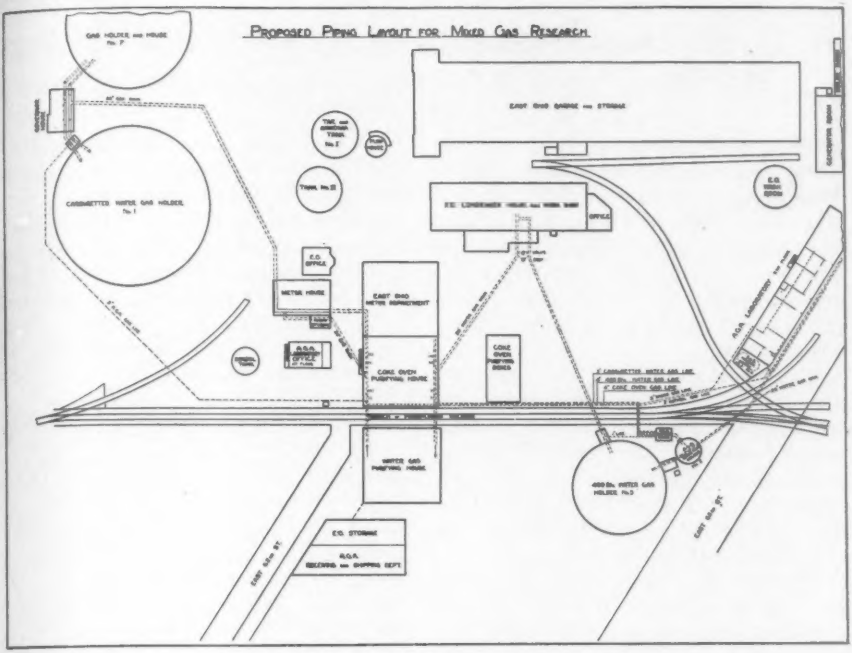
(a) Effect on flame characteristics.
(b) Completeness of combustion (CO tests).
(c) Thermal efficiency (heating efficiency in case of industrial appliances).
(d) Maximum obtainable temperature.

Practically any gas service condition in the country can be duplicated or obtained at the Testing Laboratory. The following gases or any combination of them are available:

	B.t.u.	*Specific Gravity*
Natural gas	1120	0.63
Coke oven gas	550	0.40
Carburetted water gas	300-600	0.53-0.68
Uncarburetted water gas	300	0.53
Producer gas	130	0.85

Even with the facilities that are available at the Laboratory, it is estimated that a period of from three to four years will be required to solve all the important phases of this problem. It is proposed to investigate, first, the effect of varying the specific gravity maintaining the heating value constant such as outlined under item No. 1, and, second, the effect of varying the heating value while maintaining the specific gravity constant as mentioned under No. 2.

In undertaking this investigation, the Technical Section of the American Gas Association, acting through its general committee and sub-committees, is attempting solution of a vital problem that should be of great value to the manufactured and natural gas industries for years to come. It is a subject that has or should have a direct appeal to every gas company in the country. Our manufacturing



Proposed piping layout for mixed gas research

processes are changing, supplies of natural gas in various sections of the country are rapidly becoming depleted and in other sections mixing gases has become an economic necessity.

Therefore, if the industry is to properly employ all of the resources it has available, it must determine the fundamental principles underlying the mixing of gases.

The Ruud Light Opera Hour, of the Ruud Manufacturing Company, Pittsburgh, Pa., is now telling the story of gas by radio over stations WJZ, New York; WBZ, Springfield; WBZA, Boston; and KDKA, Pittsburgh.

What It Costs to Smoke

THE actual cost of smoking, long the bone of contention of leading anti-antis, and strong-minded wives, is not limited to expenditures for cigars, cigarettes, or tobacco. Nor is a fine exacted only from those who blissfully ignore "No Smoking" signs. The smoke that goes up factory chimneys in New York to mar the beauty of the metropolis and injure the health of the inhabitants is also costing money.

Statistics covering the official record of smoke cases in New York City courts for the month of February, 1927, show that 142 summonses were served. Of this number five were dismissed, 57 had sentence suspended, and 56 received fines totalling $2,035.

In Memoriam

C. J. Weinmeister, Georgia Railway & Power Co., Atlanta, Ga.
Robert F. Brundage, Westchester Lighting Co., Mt. Kisco, N. Y.
Dudley Farrand, Public Service Corp. of New Jersey, Newark, N. J.
Mrs. E. G. Pratt, Rockford, Ill.

A. G. A. Headquarters Moves to New Offices

More Space Needed to Allow for Growing Activities of the American Gas Association

SOMETIME in April the American Gas Association will move from its present offices at 342 Madison Ave., New York, N. Y., to the new Graybar Building at 420 Lexington Ave., 43rd and 44th Streets. This building is the newest addition to the "Grand Central" group, and is known as the world's largest office building.

The varied activities of the Association are growing to such an extent that larger quarters than the present ones are an absolute necessity. Since each of the sections of the Association requires additional space that could not be provided at 342 Madison Ave., the only feasible solution was that of leasing new quarters.

The new office building probably will be the most convenient in New York City for the out-of-town visitor. A forty-foot concourse will connect the building with Grand Central Terminal, making it unnecessary for travellers to enter upon the street to reach the A. G. A. offices. Connections with all the metropolitan subways can be made without going outside, with direct access to the Lexington Avenue East Side and Corona-Astoria subways and to the shuttle trains that connect with the B. M. T. and West Side subways at Times Square.

The new building is also in the heart of the 42nd Street hotel district, leading hotels, such as the Biltmore, Commodore, Belmont, Murray Hill, Roosevelt and Ritz-Carlton, being within a few short blocks.

Members of the A. G. A. and their guests will find the new location of the Association a decided improvement. The nearness to Grand Central and the splendid transportation facilities to and from the Pennsylvania Station make it possible for visiting members to reach Headquarters without waste of time.

The latest office building equipment will make this building a 20th Century monument to progress. Innovations in passenger elevators to eliminate operators passing floors by mistake, and other modern improvements are features of the building.

The layout of the A. G. A. offices has already been constructed. The staff will have better arranged space than at the old offices, and there are provisions for a library and a filing room which, with the Board room, will take care of several committees at one time without, as at present, stopping the work of the staff.

No official "house warming" will be held when the Association moves. Every day is Open House Day for members of the A. G. A., and one and all are cordially requested to visit the new offices and inspect them in the near future. There is no reason why members shouldn't make the A. G. A. office their headquarters when in New York and vicinity.

Suitable announcement of the exact moving date will be sent to all members of the A. G. A. The cooperation of all is solicited, so that there will be no delays in mail delivery to impair the service to our members.

The Graybar Building

Getting Gas Into the Home

How to Wholesale the Completely Gas Equipped Home By Working with the Speculative Builder

By J. E. DAVIES
The Peoples Gas Light and Coke Company

MR. DAVIES has brought before the A. G. A. a subject worthy of serious consideration. His plan that will easily sell the idea of the complete comfort of adequate gas service is as simple as it is unique. With it the gas company is paid for the appliances installed shortly after date of purchase. The home owner pays for them in 10 years, the price being covered in the general mortgages.

Cooperation with the speculative builder will do much for the gas industry. It will do for every gas company what it is doing for The Peoples Gas Light and Coke Company. The speculative builder can be a powerful ally of the all-gas home idea.—Editor

THIRTY 100 per cent Blue Star homes in one Chicago block! That is not a dream; it is a reality. The homes are not yet erected, but work has been started. The deal has been consummated. We fully expect that there will be under way, ere long, not only these thirty homes, but many other blocks of Blue Star homes in various parts of Chicago, Ill.

How is it being accomplished? Well, let me go back a little way. I want you to have the whole picture. I believe it will give every gas man food for serious thought.

There is a man known to many in this city and country as a speculative builder. Just what that means I really do not know, but the term seems to carry the thought that this man is a gambler. Because this man who builds homes was given a black eye by calling him a speculative builder was the cause of my hunting him up in an endeavor to learn more about him and his trade. My first step was to buy one of our daily papers, turn to the classified advertisements under "Houses For Sale." Here he was as large as life, plying his trade, offering his wares. This is how the advertisements read: "Beautiful five-room bungalow with attic, concealed plumbing, a coal-fired warm air furnace, giving par excellent comfort. Other features are a bookcase, fireplace, and radio cabinet. Everything modern; 1½ blocks from good transportation— Price $7500."

In another column I again found this speculative builder telling the world about another house he had for sale. This building was better than the other inasmuch as he had seen to it that the attic was floored. He called attention to the fact that some day you would need more rooms, and when needed the attic would be available. This house is near a park, street and alley paved, with transportation close at hand. The all-steel coal-fired furnace was included with other features at a price of $8300.

Another speculative builder offered for sale a one-story building having five small stores. This he said was a modern building on an excellent corner. Features were electric light and coal-fired steam boiler for each store.

Looking down the page, I read about a whole city block for sale. This seller offered a piece of vacant land ready for the speculative builder.

Next my eye caught sight of an advertisement which told me of a real gambler. This fellow had the nerve to erect 20 of the most up-to-date bungalows and two-family dwellings. I thought this chap must know his business, otherwise he would not be inclined to taking such a chance.

Then I learned something about another fellow who seemed to be most conservative. What he wanted the world to

do was buy a lot and when paid for build a home.

The next advertisement was the one that appealed to me most. This man had a house for sale, one which he built himself. It had six large, light airy rooms, plenty of space for the kiddies. He had learned something about insulation because the word was spelled in capitals. He told of fuel economies, even going so far as to say it would save 30 per cent of the coal bill.

In the suburban section of the paper, I read about a company that had taken out permits to build 30 modern homes. The article quoted the price paid for the ground, and also featured the kind of homes this speculative builder intended to erect.

WHAT THE PUBLIC DEMANDS

My next move was to call on this speculative builder at his office. I told him I was a prospect for a home. He drove me out where he had built several houses; some of them were occupied, others were under way. Walking through I plied him with many questions, such as these: Why conceal the plumbing? Who wants a combination fireplace, bookcase and radio closet? Do you recommend steel clad, warm air, coal-fired furnaces? What is that piece of gas pipe for?

His answer to the first three questions was "To meet the public demand," and to my last question he answered "For the gas range."

WHAT ABOUT GAS?

After returning home, I endeavored to find out where the gas man stood in this picture. I could not find him, except in one place and that place was the kitchen. The speculative builder paints the gas man once in his picture and the reason is that the public demands gas for cooking.

Now, I'm beginning to think this so-called speculative builder is something better than a speculator. I am inclined to believe him to be an honest-to-goodness business man trying to do a real job. He knew all about such things as: Enameled sinks and bathroom fixtures, cedar-lined clothes closets, fireplaces, bookcases, and radio compartments, gas for cooking, insulation and fuel economics, coal-fired furnaces and coal bins, octagon fronts and the like. He told me he would put in the homes he builds anything and everything the public demands.

THE PLACE OF THE BUILDER

Probably the public has not clamored for gas for house heating and water heating, fireplaces equipped with radiant type heaters, destruction of garbage by fire, refrigeration by gas. Possibly the public has not worried about the smoke nuisance, nor has it considered whether or not alleys were necessary.

One might term the speculative builder an opportunist because he includes in his buildings those features which the public demands. I would not call that opportunism; I would call it plain good business. Taken all in all, Mr. Speculative Builder has been somewhat of a benefactor of mankind, considering that he has supplied dwellings fitted with those modern conveniences which people want and which make life more livable.

What would be the housing conditions in this country today were it not for the so-called speculative builder? The average family knows but little about the construction of a building.

WHY THE PUBLIC PATRONIZES THE SPECULATIVE BUILDER

These same families will go out to inspect homes that have been constructed by the speculative builder. All the burden of planning and building has been lifted from their hands. There is no occasion for them to visualize—they can see with their own eyes exactly what is offered. Moreover, they can know to the penny what the home will cost. Mr.

Builder has arranged the financing and all other details. It is for the home seeker but to say yes or no.

What can we do to get this worthy citizen, Mr. Speculative Home Builder, to give gas more consideration in his homes? I devoted almost endless thought to this question. I believed that the gas companies had much to offer the speculative builder, and I felt confident the builder would be in sympathy with it if it were offered to him in the right way.

At my invitation, a speculative builder who contemplates the erection of thirty homes in one Chicago block called at my office. I had never met this builder before, having read of his project in the newspaper. I decided he was the logical man to lay my plan before.

He did not know why he was coming to my office, except that I had something attractive to offer. I was fully prepared. I told him I wanted to help him sell the thirty homes he was planning to erect. There is no need to go into detail of our entire conversation. A review of the high spots will be enough.

I talked gas for house heating. I talked automatic gas-fired hot water service. I talked gas-fired incineration, gas-fired refrigeration and gas-fired clothes drying. I talked the radiant type of fireplace heater, and I talked a Blue Star range, explaining in connection with all these appliances the idea of the Blue Star campaign. I further explained to Mr. Speculative Builder the advantages to the householder of all these appliances. I showed him the advertising which The Peoples Gas Light and Coke Company is doing for the purpose of making householders more appreciative of these modern servants. I referred to our steadily increasing sale of these appliances. I endeavored to convince him that Blue Star homes would hold an irresistible appeal to the prospective home buyer, and would help him move his homes more quickly. As I viewed the situation, the public utilities are the modern home servants, and I endeavored to convey this picture to the

REAL ESTATE FOR SALE.
HOUSES—SOUTH SIDE.
NEW STOLTZNER BUILT
BRICK BUNGALOWS.
Alleys Paved and Paid.
One block to street cars, in new highly restricted district; 5 lovely rooms with OCTAGON front. See the latest combination fireplace bookcase, writing desk and RADIO CABINET developed especially to meet the needs of modern homes. Your house is always warm with QUAKER ALL STEEL FURNACE. Large attic floored, with ample space for extra rooms.
PRICED AS LOW AS $8,300 UP
$750 CASH

The advertisement that started the author thinking.

builder. When he left my office to give the matter mature consideration, I am certain he was convinced.

I said to my builder friend, for he was my friend before we had been together many minutes, "If you will install in your homes the gas-fired equipment I have shown you, I will help you place the news before the home seekers of Chicago. I will run advertisements in the display columns of the newspapers showing a picture of one of your homes, carrying your name as the builder, explaining the advantages of these Blue Star homes, and urging people to visit them. I will also advertise your homes on our outdoor painted signs. I will place a small advertisement in the classified columns of the newspapers, telling about these gas-equipped homes and making it clear that they are for sale.

"More than that, I will see that the employees of our company are informed about these Blue Star homes. I will urge our employees to tell their friends about them. And I will supply signs, emphasizing the Blue Star features, for display on every home under construction.

"I will also place at your disposal our

house heating engineers and our architectural department. From our engineers, you can obtain whatever assistance you require in regard to the planning of the heating equipment. More than that, this department will supply estimates of the yearly heating cost in each building. Of necessity these homes must be insulated, because they must be kept warm in winter and cool in summer.

"Our architectural department will draw typical basement plans showing ways in which the basement space can be profitably utilized, thanks to the absence of coal and ash dust and space-eating fuel bin. The latter point can be made an unusually strong talking point in connection with your homes, for think what it will mean to the purchaser in usable extra space."

My friend was impressed. He was enthusiastic. He promised that I would hear from him again in a few days, and I did. He accepted the Blue Star plan in full!

Let us not for one moment lose sight of the fact that the buyer of a new home is a "Class A" prospect for gas-fired equipment.

When the buyer is moving into a new house, he is ambitious to have the best of everything, at least up to a reasonable point, in his home. He is already investing a large sum of money in his home—the outlay of a slight additional amount, either for better equipment or for more satisfactory later performance, is minimized by comparison.

It can be pointed out to the prospective buyer that he will surely want to modernize his home at some future day if not now. If he does it now, through installing complete gas-fired equipment, he will save the expense, later, of discarding equipment for which he is paying good money today. Furthermore, he will be able to install equipment at minimum cost.

Additional expense that may be incurred through the installation of complete gas-fired equipment is not paid for in one lump sum. It is included in the total cost of the building, and in reality represents but a very slight increase in the monthly payments on a second mortgage or in the interest paid on a first mortgage.

When a new home is erected that does not carry gas heating, that home becomes the poorest of all prospects for the gas company. The owner is not likely to discard his heating equipment for at least a number of years, until such time as he has secured fair money's worth from it. Therefore, it behooves us to install gas heating when the home is new! Gas equipment should be injected in the specifications before the ground work is started.

THE ADVANTAGES

It is not necessary, here, to set forth the advantages of gas-fired equipment from the standpoint of the home owner. They are well known. One point, however, will bear emphasis. The buyer of a new home, quite frequently, is moving away from an apartment neighborhood to a home neighborhood where he will be away from the smoke and dirt of factories. Is it logical, then, for him to move into a neighborhood of smoky homes? What an appeal, when the prospective buyer can be told that every home in the neighborhood is gas-heated and therefore smokeless!

You may think I offered Mr. Prospective Home Builder too much in the way of cooperation. If you do, I cannot agree. While, from his standpoint, the advertising I offered was very attractive, still, from the standpoint of my company, it represented the strongest line of gas advertising which could possibly be conceived!

The speculative builder is the gas man's friend. He is the man who is doing more than any other man to expand the territories we serve. He can also be highly instrumental in building up, to a far greater degree than at present, the gas load in our territory. Let's cooperate with him!

The plant without smokestacks. This is how the new Huber Co. factory will look when completed this summer

Cincinnati Attacks Smoke at the Source

Factories Without Smokestacks Prove Efficient; Utility Service Responsible for Elimination of the "Smoke Distributors"

By ALVIN M. FORKNER
The Union Gas and Electric Company

CINCINNATI has the distinction of having several of what are said to be the most modern factories in the United States—those built without smokestacks. The newest of these was recently constructed by the Huber Builders Material Company, manufacturers of building materials and supplies, sectional garages, and homes.

The completion of two modern factory buildings for use by the Huber Company and the expectation that four more of similar design will be finished during this summer sounds a significant note in Cincinnati's campaign for smoke abatement.

Elimination of smokestacks from the new plants was made possible through the joint use of the twin utilities, gas and electricity. Gas is used in the up-to-date heating system while electricity is used for power and light.

These bright, warm and airy factories mark the realization of an ideal which Harry A. Huber, president and general manager, expressed thirteen years ago. He said: "I will start a business to make homes happier and loved ones healthier."

From a humble beginning in 1910, with a small downtown office, the Huber firm has grown to such size that it now occupies a spacious five-story building for its display rooms and executive headquarters, in addition to its factories on the edge of Cincinnati. It has been said that this Cincinnati concern is unique of its kind in the Middle West. It has been described as the department store for prospective home builders. There are eleven departments for furnishing the home itself in sectional form, electric wiring and fixtures, gas and electrically-operated household appliances, tiles, mantels, sectional garages, etc.

For seven years prior to the construction of the new factories, the president of the Huber firm studied conditions at lumber plants in various parts of the country. As Mr. Huber says: "Every time I saw a

An interior view showing unit gas heater

lumber plant in my travels, I stopped and inspected it." And so, during the course of that time, he gathered valuable ideas which aided him in planning and constructing his modern factories.

According to Mr. Huber, stacks pouring forth contaminating volumes of smoke no longer are a necessity. To back up his statement he offers the new factories of his company as evidence.

One of the specifications which Mr. Huber considered in making the plans for his factories was that there should be no unnecessary waste of floor space. In designing the gas heating system he conferred with E. W. Esslinger, industrial engineer, associated with the Gas Commercial Department of the Union Gas & Electric Company, who made recommendations for a unit heating system.

The principal feature of this system of heating factories is that it requires no attention and is very flexible in operation. It may be turned on full force or cut down to the minimum to meet the temperature requirements. Otherwise it is controlled automatically by means of thermostatic valves.

These units operate independently of each other and may be either attached to the wall or suspended from the ceiling without lessening their efficiency. Air is sent through the units, where it is heated, and then is gently circulated throughout the factory by means of electrically driven fans. Because they are constructed on the re-circulation principle, air from inside the building may be used on the heaters over and over, where conditions permit, or fresh air from the exterior is taken and heated before entering the factory. Tests conducted at this plant show that the unit heaters operate at a very high rate of efficiency, since the flue temperatures are no higher than the heated air issuing from the heaters, indicating that the sensible heat of the gas consumed remains in the building. The cost of operating the fan for the circulation of the air is equal to that of an ordinary 60-watt lamp.

Another feature of this heater is that if the heat is wanted in only one section of the factory, it can be so directed by adjusting the fan.

An elaborate blower system has been provided for the removal of sawdust and shavings. Through the adoption of this system, dust in the air is almost entirely removed, keeping the air pure and fresh at all times, thereby safeguarding the health of employees.

All gas and water mains, electric conduits and the pipes for the blower system are housed underground in a specially built tunnel, so that access to any of them may be had at any time. A special concrete vault, in the form of a subcellar, houses all meters in one section and is also used to house the electric transformers.

Exterior view of one of the smokestackless factories

EDITORIAL

By ALEXANDER FORWARD
Managing Director

Fact Finding

BECAUSE the growth of our business is both gratifying and indicative of the great economic forces that are behind further utilization of manufactured gas, it is doubly important to be sure of our foundation. To record the largest annual increase in sales in our history in 1926 is a compliment to our business; it is at the same time a challenge for the future. Our success must be based on the bedrock of knowledge and its practical application. If not, we may soon find our structure weakened.

Modern buildings are supported by concrete foundations, with a myriad of steel girders extending to every part, giving strength, fulfilling the part of veins in the human body. Modern business organizations are likewise supported by strong sub-structures and framework. No theory can support a colossal cathedral. Similarly, no industry can progress as it should without basic and fundamental economic facts to guide it.

The committee engaged in selling the idea of cost analysis to the gas industry has done an important work in helping us to build our future plans on firm ground. The report of this committee, rendered at the 1926 convention, was a comprehensive recital of progress to date. Letters have been sent to the members of the Association and to the executives of gas companies in an effort to stir interest in this necessary accounting procedure.

Cost analysis is destined to play an important part in our industry's future. It is of value to the executive, to the sales department, to the rate maker, and to the engineer. It is inexpensive and worth many times its cost. The committee's report, giving complete cost analysis figures for two member companies, testifies to this. Cost analysis eliminates guesswork and digs beneath the surface to reveal the true significant facts.

The engineer-architect must plan for efficient enlargement of a factory. Analyses of costs are incalculable aids to proper planning and, like the physician's diagnosis, lead to correct methods of treatment. Cost analysis is not a panacea. It is an ascertainment of the facts. The industry cannot well be without it.

About That Slogan

WE are receiving letters critical of "If It's Done with Heat, You Can Do It Better with Gas." Also letters commendatory of that saying and protesting a change. Thoughtful heads are devoting time to a list of suggestions; other well-filled domes are telling why matters should stand as they are.

Whatever the result, the time is propitious for a settlement one way or the other. Headquarters will be glad to hear from you. The best time to be vocal on this subject is now and not after a change is made or not made as the case may be. Won't you write us at once?

The Public Answers The Baltimore Company

THE Public's Answer," the title of the 1926 year book of the Consolidated Gas, Electric Light and Power Company of Baltimore, Md., asks the question, "How useful is the utility company to the public?" The public has answered in terms of what it buys from the company. Electric and gas service, or the comfort and convenience of light, heat and power, is offered to the public at a price. In the increasing use of the services is found the answer to the question.

The 1926 book, of which Arthur W. Hawks, Jr., is editor, well merits a place along side the other year books of this company. Each year the Baltimore company has published a book of exceptional typographic style and of excellent content. "The Public's Answer" is another ace. Excerpts from the chapter on gas are as follows:

In 1910 the per capita use of the company's gas system was 4,629 cubic feet a year. The per capita expenditure for this use was $4.41 a year.

In 1926 the per capita use of the company's gas system including use by industries was 12,641 cubic feet a year. The per capita expenditure for this use was $10.19.

In 1910 the Company's gas customers used about three billion cubic feet of gas, of which two billion were manufactured by the company and one billion bought from the by-product coke ovens at Sparrows Point, Maryland Steel Plant.

In 1926 the Company's customers used over eleven billion cubic feet, of which six and one-half billion cubic feet were manufactured and the remainder bought at lower cost from the coke ovens.

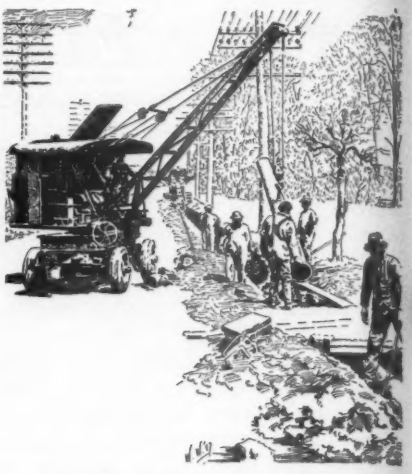
The capacity of the Company's gas generating plants has increased from twelve million cubic feet per day in 1910 to sixty-seven million cubic feet per day in 1926.

In the gas distribution system the number of miles of mains in 1910 was 637, in 1926 the number of miles was 1089. During these years the number of services extending from the main lines to customers' residences increased from 99,468 to 168,764.

The territory served with gas in 1910 had an area of 70 square miles. In 1926 the Consolidated's gas service covered a territory embracing 120 square miles.

In 1910 the Company had made its gas service useful to 99,422 customers. In 1926 the number of customers using gas service was 184,036.

The growth in the number of gas customers in the sixteen years of the present management has been nearly as great as during all of the ninety-four years that went before and the use of gas grew nearly three times as much in the past sixteen years of the company's history as it did in the first ninety-four years.



Efficiency in the use of raw materials, vigilance in maintaining the system so that the quantity of gas lost through leakage would be very small and co-ordination of the gas manufacturing plants with the coke oven supply from Sparrows Point have, together with increased use and improved conditions of use, given to the people of Baltimore rates for gas so low as to be outstanding compared with those in the other cities of the country.

Despite the fact that the amount of coke oven gas increased from one billion cubic feet in 1910 to five billion cubic feet in 1926, the amount of generator fuel used by the Consolidated Company increased from 34,492 tons in 1910 to 102,106 tons in 1926.

The amount of oil required in the Company's gas operations increased from 9,019,223 gallons in 1910 to 16,207,951 gallons in 1926.

BOOKLET OF APPROVAL NOW PRINTED BY LABORATORY

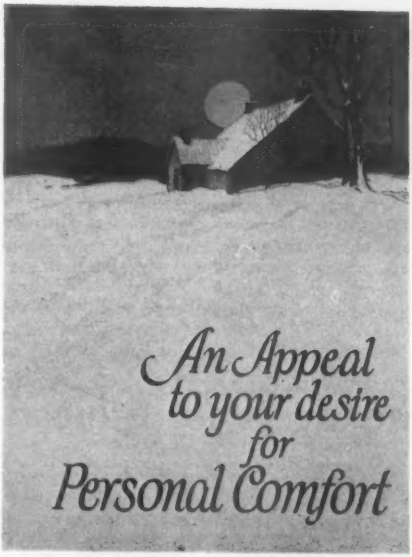
THE A. G. A. is now providing a loose leaf, leather binder for the list of gas appliances that have been approved by the Testing Laboratory at Cleveland, Ohio. The binder contains a list of all appliances tested and approved as of February 1, 1927. Additional sheets containing later approvals will be issued monthly.

One copy of the Laboratory Approval list is being sent to each company member of the Association. Additional copies can be obtained from R. M. Conner, director, American Gas Association, Testing Laboratory, Foot of E. 62nd Street, Cleveland, Ohio. The price of these extra binders is two dollars, which price includes the service of monthly approval sheets for one year.

Can We Sell House Heating at A Profit?

By HERBERT H. SKINNER
Gas Sales Manager, The Dayton Power & Light Co., Dayton, Ohio

EVERY utility operator is today engaged in the *Heating Business*. You have surveyed the potential field, developed equitable rates and foreseen its engineering problems. One man or possibly an entire department is now engaged in its promotion, but when it comes to a *Business Policy*, one notes in many instances lack of effective coordination with the *Heating* trades.



Cover page of booklet distributed by cooperating plumbers

A sound *Business Policy* is essential to success, and without it Marshall Field and A. L. Filene would in each instance soon have been demoted to the yard goods counter. You now reason in terms of gas sendout, but to sell the fuel some one must also distribute a furnace or boiler in which it is to be burned. You are thus confronted with a situation in which the utility must determine a course of action involving competition or cooperation with the local dealers in heating equipment. Let us immediately dismiss the thought of competition, and see exactly how much cooperation we may reasonably expect from the master plumber and sheet metal shop.

Would you blindly purchase land without a title search or a piano without the advice of a musician? Are not your clothes a measure of your faith in the tailor and the golf balls like those that Hagan used? Why, then, may I ask, should we expect that any hard-headed business man would accept our judgment on the heating equipment for his new home. It is to the much maligned master plumber to whom he turns on wintry nights when pipes are frozen and tanks and traps are clogged. Like the physician he fills a vital position in the community and will be consulted in the choice of any burner or boiler essential to the use of a new fuel.

Most communities seem to have about one master plumber for every three to five thousand population. Some are hardly more than what are known as basket plumbers, but they all sell an occasional furnace or boiler. There are also the sheet metal men and the combination shops. Collectively those dealers form a wonderful retail organization. Are they distrustful of the utility, and if this is true, is it not possible that you have failed to take them into your confidence? Are they aware that money can be made on gas merchandise, and that the utility will entirely safeguard their interests?

Fuel fired boilers are sold at 20 per cent or in some instances only 15 per cent from the manufacturer's list. The master plumber in any case adds 25 per cent to his cost, f.o.b. customer's premi-

ses, and estimates on the complete installation. It is an equitable percentage and one that any utility can reasonably quote, but let us also sell that plumber on the dollars not percentages that accrue from the sale of our product. He must understand that on a 700 sq.ft. fuel-fired boiler, selling at $160, the margin will be only $32; whereas on a gas-fired boiler, costing $456 there would be a profit of $91.20 combined with a saving on boiler covering. One must also sell the idea of our service and that our sale is a clean sale where the profit is a real profit attained more easily through the fine cooperation of your sales organization.

Dayton operates under this simple policy:

(1) Negotiations with the Consumers
   a. Thirty days net.
   b. One-third cash with order; one-third in thirty days; and one-third in sixty days. Net without interest but protected with lease.
   c. On fifteen months time payment plan. One-third in cash and one-half per cent a month interest on face of lease contract.

Note: All contracts complete including installation and service. Construction to be by Master Plumber.

(2) Open account sales of boilers to the

(Continued on page 244)

Prizes to Employees for Educational Papers

By E. B. LUCE
Educational Director, The Consolidated Gas, Electric Light & Power Co., Baltimore, Md.

IN the educational program of the Gas and Electric Company, provision is made for cash prizes to employees who prepare papers of worth and merit on subjects which are pertinent to the operations of the company.

The opportunities to employees for growth and development through reflective thinking and constructive effort as well as for improvement in the company's service, which are made available through this new offer, are comparable with those open to employees in outside courses, Group Educational Work, and training for new employees.

Dr. C. R. Mann, who has made a study of engineering education for the Carnegie Foundation for the Advancement of Teaching and is responsible for training in the United States Army in developing man power, says:

"The best mental discipline possible for any man consists in setting him to active and persistent thought about the things he daily sees, does and handles, and all their relations and connections."

In the army the proper training of soldiers is of great importance in winning victories; in business the proper training of employees often brings out the statement, among the reflective and forward looking, that if employees are properly and efficiently trained, profits will take care of themselves.

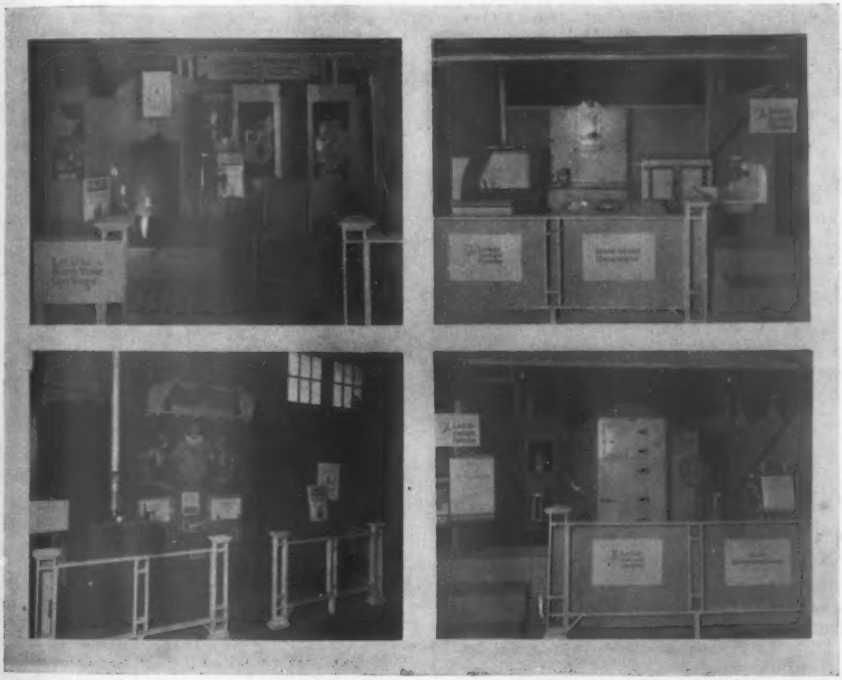
In September announcement was made that seven employees had at that time been awarded prizes, two receiving $50 each for the preparation of manuals of procedure. Since that time two additional manuals have been prepared, reviewed and accepted, and the authors have been awarded prizes of $50 each. Besides the manuals, eighteen additional papers on various subjects have been submitted. The total amount awarded for prizes since the offer became effective on July 1, 1926, is $337.

A Refrigeration Question Answered

Why the A. G. A. Laboratory Is Not Testing Refrigerators for Approval at This Date

GAS refrigeration, now on the verge of national development, has brought up an important question, that of approval by the A. G. A. Testing Laboratory. Because the Laboratory Blue Star Seal is now recognized as an important mark on any appliance, and because refrigerator manufacturers have continually been asked why their product has not been approved, the Association feels that an explanation is necessary.

Refrigerators will be tested and approved by the Testing Laboratory just as soon as the necessary arrangements can be made. However, first it will be necessary for committees to prepare national approval requirements and have them sanctioned through various agencies, as is done with all other appliances tested for approval by the Laboratory. The art of mechanical refrigeration is not, in the judgment of men best informed, sufficiently standardized to say there is any committee capable at this juncture of drawing up specifications for use as national approval requirements. Work is under way to this end, and results will be made available at the earliest possible moment.



Views of exhibits of the Laclede Gas Light Company at recent Women's Exposition in St. Louis. The importance of the refrigerator is shown by the fact that it ranks with the other gas appliances

Chapters on Scientific Progress Now Available

WHAT represents one of the most comprehensive reviews of scientific progress affecting the gas industry is now available in chapters prepared by the Chemical Committee of the Technical Section of the American Gas Association. Recent progress in science in relation to the gas industry is covered in the 17 chapters soon available in printed form. Each one has been prepared by a member of the committee who is specially qualified to pass critical judgment in the particular field which he has covered.

Each of the chapters has been printed in separate pamphlet form, although a limited number of bound volumes are available. The pamphlets will be supplied at actual cost of printing.

The complete list now available, with the names of the authors, is given below:

Constitution of Coal, J. J. Morgan
Physical and Chemical Properties of Coke in Relation to Its Manufacture and Use, A. R. Powell
Carbonization of Coal, H. J. Rose
Water Gas Manufacture, W. H. Fulweiler
Complete Gasification of Coal—Use of Oxygen for Gas Making, R. S. McBride
New Processes of Interest, R. T. Haslam
Cleaning of Combustible Gases with Cottrell Electrical Precipitation Processes, N. W. Sultzer
Tar Refining and Tar Products, J. M. Weiss
Light Oil Recovery and Refining, E. F. Pohlmann
Recovery of By-Products Other Than Tar, Ammonia and Light Oil, H. A. Curtis
Gas Purification, F. W. Sperr, Jr.
Corrosion, W. J. Huff
Materials of Construction, J. F. Anthes
Blending Natural and Manufactured Gas, C. J. Wright
Recovery of Waste Heat in Gas Manufacture, E. L. Hall
Analytical Methods and Tests, A. F. Kunberger
Application of Physical and Physico-chemical Research to Control Measurements in Gas Manufacture, S. P. Burke

Keep Yours—and Use It

THE Classified Directory of Manufacturers of Gas Equipment and Appliances which accompanies this issue of the MONTHLY represents a service of considerable value to our manufacturer members.

The Directory, however, can only be of maximum use if the information carried therein is reliable. Our members are, therefore, urged to furnish headquarters with all information pertinent to and of a nature to be included in this pamphlet.

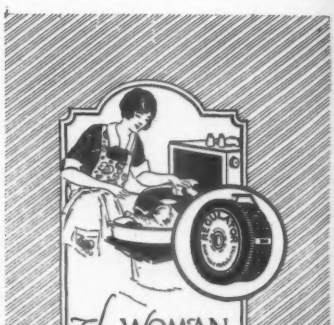
To derive the full benefit from the Directory our manufacturer members should furnish us with a complete list of their products and trade names of interest to the gas industry.

It is felt that the typographic changes made in this issue of the Directory will make it of even greater value than it has been. Special care has been taken to make the text and tabulations easy to read.

Automatic Oven Booklet Now Available

AN attractive 12-page booklet entitled "The Woman at the Wheel—a Story of the Self Action Kitchen," has recently been published by the Consolidated Gas Company of New York. The booklet covers the many advantages of automatic oven regulation.

Because it is one of the first booklets dealing with this subject in a general way, the A. G. A. has made it possible for other companies to purchase this booklet for distribution to their customers. Sample copies can be had by writing to Association Headquarters. The price of the booklet is one cent a copy in lots of 1000 or more.



Front cover of the attractive booklet on automatic cooking

Harvard Announces Summer Course in Public Utility Management and Economics

Philip Cabot Will Be in Charge of Six Weeks' Study Class for Executives of Utility Companies

Prof. Cabot who will be in charge of the summer course at Harvard

A SUMMER course in Public Utility Management and Economics primarily for public utility executives will be offered in the Harvard Summer School during the coming summer, under Dr. Philip Cabot, in charge of the public utility work in the Harvard Business School.

With the rapid growth in the public utility industry in the last thirty years has come the opportunity and the need for trained men, familiar with the complex problems of the industry and capable of dealing with the varied legal, engineering, economic, and financial phases of management incident to the rapid expansion both of service and capital investment. The need for special training arises from the peculiar nature of the services rendered and from the relation of the industry to its customers and to the State.

The aim in this summer course is to provide the younger executives of the public utility companies with a compass and sextant by which they can determine their position and steer their course through the difficult years which may be ahead of them. Much of the work of the course will consist in analyzing a large number of actual cases or problems which have arisen in the industry in the various phases of public utility management.

The course will open with a discussion of "What is a Public Utility?" The concept is simple, and merely defines the relationship between the individual or industry and the community, which brings them within the scope of the police power in case it seems advisable to use it. The practical question as to whether the police power should be used in this way in any particular case is an economic or business question, and in the final analysis must be decided upon economic grounds.

Next will be taken up a considerable group of valuation cases. These fall quite naturally into two divisions: (1) The decisions of the highest courts in cases where confiscation of property is claimed; (2) Commission decisions in rate cases. Here valuation is not really the prime object of litigation. The point at issue is commonly a rate, and it is here that the worst confusion of mind enters. Regulation should aim to regulate prices and not profits, and so far as possible, prices should be regulated directly and not by the roundabout method of valuation.

After dealing with the subject of regulation the course takes up the problem of rate making. This is primarily a function of management, and most rates never come into the field of litigation. The regulating power of the states, however, must always be considered by rate making officials. Discussion of rate making will be divided into two branches, one the wholesale competitive field, and the other the retail or non-competitive field. In the wholesale field, prices must be made so as to move the goods, and the test of a good rate is that it does so. In the domestic field, however, the problems of rate making are far more difficult. Here the value of the service to the customer is more difficult to ascertain, and, what makes matters worse, the customers are combined in such a way that they bargain as a unit and have very great political influence upon regulating commissions. The result both in the electric industry and in the gas industry has been

Portion of the campus at Harvard

that the margin of profit in this department of the business has been reduced to a minimum, and there is grave danger that in the future it will reach the vanishing point. The years immediately ahead will be particularly trying in this respect.

Following the discussion of rate making the question of production management is taken up. This is a purely economic question having to do with the optimum size of manufacturing and distributing units, and the point at which the law of increasing returns passes over into the law of decreasing returns. The problem is particularly difficult in the gas industry.

After the problems of production management come the financial aspects of management. In this field it is assumed that the men have a knowledge of ordinary industrial finance, and the course deals only with those aspects of finance where public utilities differ from industrial enterprises.

In closing, consideration is given to some of the broader economic aspects of the public utility industries as a whole. In the gas industry, for instance, there seems to be a tendency to vertical integration, and it seems possible that the time may come when the gas industry will be integrated from the coal or oil in the ground to the final finished products—gas, coal, and the chemical components of the oils and tars. The effects of seasonal and cyclical variations are very important, especially the effect of the business cycle on the electric utilities which have now developed such a large business in the industrial field. What is becoming apparent in the electric utilities will shortly appear in the gas utilities also, as they develop the fields of house heating and general heat treating. In the past the business cycle has been a matter of minor importance to the public utility manager, but unless rate making is very skillfully done, the next period of severe and prolonged industrial depression may hurt some of the utility companies severely. It is one of prime importance that the executives of the companies should know as much as is now knowable about the experience of other industries in dealing with these problems.

The course will take the full time of the students for the six weeks period from July 5 to August 13, 1927. Classes will meet three hours daily for six days

(Continued on page 218)

Why Do It With a Slogan?

Another Point of View Regarding the Discussion of a Suitable Battle Cry for the Gas Industry

By HENRY OBERMEYER
Assistant to the Vice-President, Consolidated Gas Co., New York, N. Y.

WHY all this bother about slogans for the gas industry? One writer, at any rate, has fondly believed that advertising was slowly but surely emerging from the slogan era. There is at least a doubt as to whether the attempt to find a slogan is a step upward or backward. All too often it is a lazy attempt to convince without the bother of adducing evidence.

Modern students of advertising decry the use of slogans except where the situation, rather than a determined effort, brings them into being. Even those slogans which have been conspicuously prominent in our national advertising are being dropped one by one, including those of cigarettes, automobiles, and soaps.

However, if we still insist on having a slogan to be used indiscriminately for all conditions and circumstances, let us first have some kind of an understanding of what a slogan is and what it can be made to accomplish.

Essentially, there are only four kinds of slogans. The first is nothing more than a curt command, which could be translated into some such phrase as "Do It With Gas."

The second class of slogans is that which baldly makes a claim for quality and performance, such as the one now being used by the American Gas Association, "You Can Do It Better With Gas."

The third class of slogans is nothing more than an attention-getter, usually some tricky arrangement of words with a special appeal such as rhyme, lilt, or the suggestion of some familiar reference. In this class comes all such slogans as "You Can't Beat Gas Heat," and "Gas Knows *No No.*"

The fourth class of slogans is that which, by a felicitous phrase, offers an essential selling argument or idea. This class should be carefully distinguished from that which contents itself with the bare statement of a claim. Two outstanding examples of the "idea" class may be found in the two slogans, "Save The Surface and You Save All" and "Say It With Flowers." The latter also falls within the "command" class of slogans, but is lifted into the "idea" class by its appeal to human experience. No further selling argument is needed to back up either of these phrases, and that, after all, is the essential test of all sloganeering.

I doubt if any slogan comparable to these will ever be found for the gas industry, and I still more seriously doubt the advisability of becoming wedded to one, even if we found it. The nearest I have ever found to such a slogan is the phrase, "Control With Gas Heat" which, obviously, carries its own selling argument.

The present agitation for a new slogan apparently rises partly from dissatisfaction with the present one, and partly from the unconscious recognition that no slogan is immortal nor even as protean as some would like to make it. Like all slogans of the purely "claim" class, "You Can Do It Better With Gas" is becoming frayed at the elbows and shiny at the shoulder blades. Now that Ivory soap no longer "floats" at every possible excuse, and Camel smokers no longer "walk a mile" for their favorite brand, the national limitation of slogans at their best is becoming apparent.

Al Fischer, in the March issue of the A. G. A. MONTHLY, had the right idea when he pointed out that "Today, in the world of business, the slogan serves as the battle cry of the campaigns for trade." Previously, he also called it "an attempt to align the emotional public on our side."

Emotions, of course, are things only of the moment, and are useful only for the brief period of a single campaign. "They shall not pass" was useful for the Marne, but would have meant nothing at Verdun. Good slogans grow out of emotion. They almost never create them.

Harvard Course

(Continued from page 216)

a week, and the same material will be covered as in the full winter course in the Harvard Business School. In addition to the classroom work, at least five hours a day of preparation will be necessary.

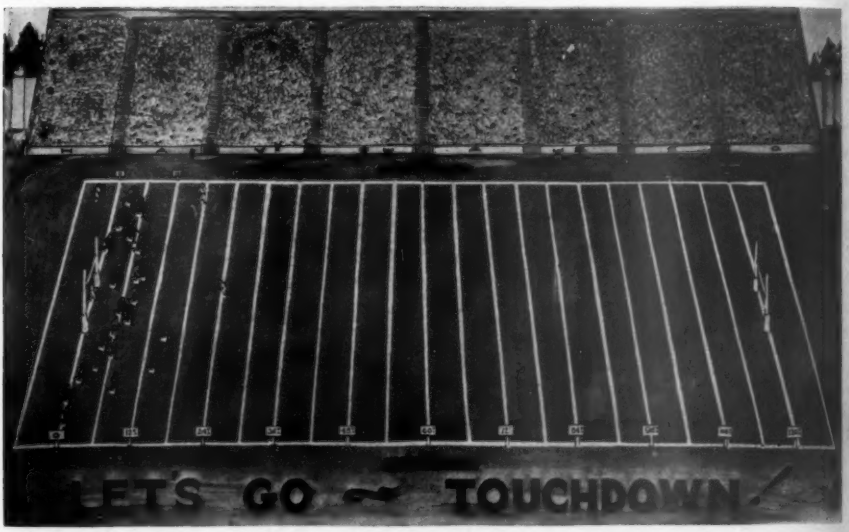
Enrollment will be limited to fifty men, and application should be made as early as possible to the Harvard Business School, Cambridge, Mass. The tuition will be $100.

Public Service of New Jersey Plans Expansion

UPWARDS of $57,000,000 is available this year for new construction, extensions and improvements by the Public Service companies throughout the territory they serve in New Jersey. Of this sum $31,064,381 was authorized in the 1927 budget, the other $26,000,000 having been authorized in previous budgets and covers work now in progress.

One of the interesting expenditures contemplated is $50,000 for aerial photography, consisting of hundreds of pictures taken in the air and to be pieced together as a mosaic, giving a comprehensive outline of the company's territory.

The gas department budget is close to $2,000,000 and will provide largely for the laying of new mains in territory where population is increasing and for the reinforcing of existing facilities. Improvements of the department's gas manufacturing plants will be made.



Sales stimulation chart used by the Haverhill Gas Light Co. for the purpose of comparing the sales of the district representatives for 1927 against 1926. With eleven representatives in Haverhill proper there are twenty-two men on the chart, one representing 1926 and the other 1927. They wear different colored jerseys, red representing 1927 and blue representing 1926 and on each jersey is the number of the individual's district. By glancing at the chart during the year a representative can see how he compares with himself for the same period during last year. The object of the chart is for each man to score a touchdown which can be attained if their sales this year are 20% over last year. The actual dimensions of the chart are 44" long and 29" wide. The leader carries a ball and each month when the sales are posted the representatives are anxious to see which one will carry the ball for the coming month. Each man receives credit for all sales in their district except house heating and industrial sales.

Gas is the ideal fuel for heating the bungalow or the mansion. Seasonal costs vary from $143 for the 4-room house to $2532 for the 30-room house

What the Central Station Fuel Bin Offers

Experience of Large Mid-Western Company Shows It Pays to Sell Gas Service for House Heating

By FREDERICK C. MACKEY
Vice-President, The Public Service Co. of Northern Illinois

FIVE years ago the Public Service Company of Northern Illinois had installed on its lines about fifty gas-fired hot water and steam boilers, commonly known as the Central type of heating plant. Some of these installations had been in use for three or four years and we were able to determine in our own minds, from tests which we conducted, that house heating was practical in large volume providing it could be furnished the customer at a price which would be considered fairly reasonable.

Until October, 1923, it was costing our customers the equivalent of 35 dollar hard coal to heat their houses with gas. I am convinced there would have been many more demands for service at this price if we had never established a lower rate for house heating, but to anticipate a rapid growth of business would have been erroneous. With the establishment of a new rate, the volume of sales in this portion of our business has steadily increased, and although our customers are paying the equivalent of 24 dollar hard coal we are securing new business very rapidly, for the central station gas company has something more to offer than merely the sale of an appliance to a customer.

In building up a concrete organization for the sale of gas-fired equipment for house heating we have kept constantly before our salesmen the necessity of selling the customer service. We have made our customers feel that we assume an obligation every time we connect a gas-fired boiler on our lines. We make them feel, with the installation of the boiler, that they may cease to worry over any attendance they have had to give formerly to the successful operation of apparatus burning solid fuels.

It is an easy matter to convince any human being of the pleasure to be derived in getting up in the morning and finding the house comfortably warm, or of coming home in the evening and not being forced to tend to the furnace. It is also easy to convince a prospective customer of the value of automatic control main-

Presented at the Mid-West Sales Conference, Chicago, Ill.

taining a uniform temperature throughout the entire house.

We have a successful lever in approaching the woman of the house in stressing forcibly the cleanliness of a gas-fired plant. It remains with the salesman to use this imagination in presenting factor upon factor in a sales talk, to convince any member of a household that money may be saved and labor need not be expended in controlling the plant.

In selling gas for house heating, if we thoroughly inculcate the idea of the value of such a service to the customer, we have placed the prospect in a frame of mind to be receptive to the quotation we present, covering the first installed price of equipment and the seasonal cost of fuel.

In our company, we have determined methods of figuring very quickly the seasonal cost of heating per square foot of direct hot water or steam radiation. We make it a point before submitting a quotation to be certain that measurements are taken of the cubical content of the house to ascertain that sufficient radiation is installed before quoting the seasonal cost to our customer.

NECESSITY OF CHECKING RADIATION

It is only in recent years that scientific methods of figuring and installing radiation have been generally understood. Even today through ignorance of these methods, through carelessness or in some cases intent, houses are under-radiated.

Assume an example of this type: A salesman measures the radiators of a hot-water system and finds 1000 feet installed. In checking up the cubical content, the exposed walls, glass, air infiltration and type of construction, he finds 1200 feet should have been installed. This example is not an exaggeration. We have found some worse than this. Suppose the customers' seasonal fuel cost is based on the 1000 feet, say $550.00 when in reality it should be based on 1200 feet, say $660.00. Can you picture the customer being satisfied at the end of the season having to pay $120 more than he planned?

An estimate made to the prospective customer of the seasonal cost of operation is made in writing, and we endeavor to give the customer a truthful statement of the operating cost. We would rather be a few dollars high than a few dollars low. Our experience has been that if the prospect is thoroughly sold on the idea of central house heating service and we refer him to installations already on our lines where careful analysis of seasonal operating cost have been given, the sale in the majority of cases is assured.

It will be noted that I referred only to solid fuels in making the comparison of costs, for I believe oil-fired installations are bound to be a help to us rather than an impediment in promoting our business. The automatic operation of oil burners has taught many people the convenience of a fuel, other than a solid. It is a foregone conclusion with the deterioration of installed oil-fired equipment and a rise in the price of oil many will request gas for house heating. Only time will bear out this contention, but some ten per cent of the gas-fired installations we have on our lines at present replaced oil-fired equipment.

The gas company must persistently maintain its contact with the public in the sale of gas-fired house heating equipment and it will be many years, if ever, before we will be in the position of assuming that heating contractors will tell the story of gas service to our customers as completely as our industry is doing.

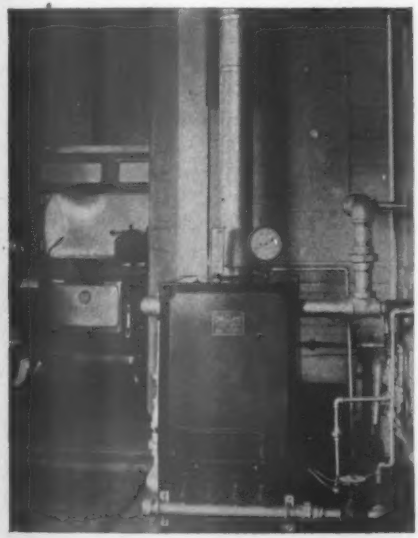
It must be remembered, however, that the central station is not in a position to act as a specialist in carrying on the work of heating contractors, and it is very plain, therefore, that the installation of boilers shall be ordered through reputable heating contractors. This source of contact is an important one and our company is very much gratified with the cooperation we have had in dealing with these contractors. As time goes on we will find the major portion of our sales, in new homes partic-

ularly, will be made by the heating contractors specifying gas-fired equipment through the architects or direct to the customer. It is very evident that we should continue to carry on this plan which can only result in mutual benefit.

After the sale has been made and contact with the heating contractor has been established, the company must follow through until the boiler is properly installed and is operating to the complete satisfaction of the customer.

The obligation assumed by the company is not discharged with the installation and lighting up of the boiler. If we keep the promise made when the order was taken, we must see that everything is kept in order to supply the customer with automatically controlled heat throughout the entire season.

The Public Service Company of Northern Illinois endeavored to determine from the experience of other central station companies how much servicing was necessary to keep a boiler in constant operation and as we could not discover that any set rule worked satisfactorily for our needs,



The bungalow's heating plant

The mansion is kept warm by this 33-section boiler. The small boiler heats the 500-gallon storage water system

we established a service department to take care of house-heating plants exclusively. We maintained a 24-hour service, with automobile trucks with trained men to respond instantly to a call. We laid out a plan to inspect the customer's boiler during summer months, place it in operation in early fall and make a very thorough inspection of every boiler each month during the entire heating season. An analysis of the work of this department indicated to us that an elaborate plan of this type was unnecessary, and at this time we make one major and one minor inspection per year and depend upon trouble calls, which are very few, to keep our customers furnished continuously with heat during the entire season.

We accumulated data by reason of our monthly inspection plan which is serving as the basis for our present operations and we are still thoroughly sold on maintaining a 24-hour service to respond to trouble calls.

Most of our experience, until the end of 1925, has been with radiator systems rather than air convected from ducts. It

is becoming increasingly apparent that one important factor in building up the house-heating business is in securing that portion which is available in the warm-air furnace field. About ten per cent of the total installations on our lines at the present time are warm-air furnaces and nearly all were sold last year. A broad field is open to our industry for gas sales through the medium of warm-air furnaces. Great care must be exercised, however, when installations of this type of equipment are made.

In the hot water and steam radiation field it would seem that every possible effort has been directed through expert research and engineering to educate the heating contractors.

Sometimes the installation is good and sometimes it isn't, not from the standpoint of workmanship, but rather from lack of knowledge of the basic essentials of heat distribution, elimination of dead air pockets and the proper proportioning of duct vents and returns.

We are receiving every possible assistance today from manufacturers of insulation. These business men are very anxious to promote the sale of their product and we on our part are just as anxious to be able to show our customers economy in operation of the gas-fired plant which is accomplished if a house is properly insulated. From our study of actual conditions we found savings of from 10 per cent to 40 per cent possible in seasonal fuel bills according to kinds and grades of insulating material used.

It is highly important that the industry do everything possible to aid in a more extensive use of these materials, for as fuel savings are effected, so will the use of our product become more universal. The weather-stripping of windows and doors will often effect a saving of from 10 to 15 per cent.

A report to the first of February shows the Public Service Company of Northern Illinois to have installed on its lines 1012 hot-water boilers, steam boilers and warm-air furnaces. They range in size from a four-section boiler which takes care of 215 feet of direct hot-water radiation, with a seasonal bill of $143.00, to an 82-section steam boiler with a seasonal bill of between $6,000.00 and $7,000.00. Our records show us that the average home in our territory, where gas house heating plants are installed, is consuming approximately 500,000 cubic feet of gas during the heating season. This better than 500,000,000 cubic foot load from over 1,000 installations is certainly desirable business when you estimate that our customers last year paid an average of 83 cents per 1,000 cubic feet.

In February we effected a combination of our general rate and house heating rate making it possible for our customers to use gas for heating water, incineration, cooking laundry purposes, garage heating, and for radiant fires, at the same price during the house heating season as they pay to heat their homes.

This is bound to stimulate greater sales of hot water storage systems and will add additional customers to our lines for house heating.

We pay too little attention to incineration. Everytime we remove the solid fuel plant and replace with gas-fired equipment we have a logical prospect for incineration.

Up to the present time we can not say that we have found any appreciable strain on our distribution system from the 1,000 installations. Any strengthening or enlargements of feeder systems have been well worth while in consideration of increased yearly revenue.

When new real estate subdividing is promoted within our territorial boundaries we cooperate to the end that ample main capacity is provided to take care of house heating requirements according to the type of community.

We believe there is no question that the Gas Company must eventually take upon itself the serving of communities within its boundaries for house heating and preparations should be made accordingly to accommodate the load.

What Will the Weather Be?

A Service That Will Help the Gas Company By Predicting the Future Climatic Conditions

Dr. H. H. CLAYTON
Clayton's Forecast Service, Canton, Mass.

THE earliest efforts to forecast the weather were based on observations of the sky over the head of the observer and on the behaviour of plants and animals. The observer thought that the same kind of weather prevailed everywhere and that sunshine and rain were dealt out by his local gods or by evil spirits. With the coming of a more scientific age, people began to seek for explanations of the weather among the natural causes and there sprung up a belief in the influence of the moon. Careful investigations have not sustained this belief, but point rather to the sun as the cause of weather changes. But how does the sun's heat bring about these changes? This is a question to which there would be many answers at the present time.

Many weather men believe that storms are caused by the unequal heating of the diversified surface of the earth. The earth's surface is heated by the incoming radiation from the sun and cooled by outgoing radiation from the earth. Land surfaces heat and cool more rapidly than water surfaces, dry deserts more rapidly than moist regions and the equatorial region more rapidly than the polar region.

The flow of air brought about by these contrasts of temperature results in storms. Instead of the direct heating of the earth's surface under the sun's rays and its cooling by nocturnal radiation being the cause of storms, others believe that the drift of warm and cold water in the ocean is the prime factor in the production of weather.

All of these causes undoubtedly have some influence in making or modifying the weather, but scientific thinkers are now seeking for more fundamental causes. The Smithsonian Institution for many years has been perfecting instruments and methods for measuring the amount of radiation which comes to us from the sun and now asserts with confidence that it varies. The scientific imagination of Langley, who initiated this work, and the skill, persistence, and courage of Abbott, who has developed it, are worthy of the highest praise; and the fundamental importance of this work to the science of the weather will ultimately meet with universal acceptance.

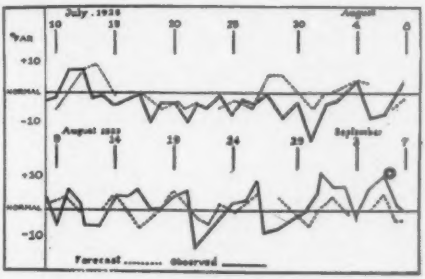


Chart of weather forecasts

What effect these solar changes have on the earth's weather was a subject of investigation by me when in charge of the forecasting division of the Argentine Weather Service, and I found at that time they exert a well defined influence on our atmosphere. This research was continued in the United States under the auspices of the Smithsonian Institution and the results indicate that the variations of the sun's radiation are of the utmost importance in meteorology. When taken in connection with visible changes on the sun, they furnish a new and more scientific basis for forecasting the weather.

The new knowledge of the causes of the weather makes it possible to anticipate the origin of weather areas and to

forecast the day-to-day weather with a fair degree of accuracy for from five days to a week in advance.

For two years I made daily forecasts of the temperature in New York for five days in advance and forwarded them to the Smithsonian Institution whose verification shows that when high temperature was predicted the temperature averaged above the normal and when low temperature was predicted, it averaged below the normal at that station.

That the forecasts of temperature are meeting with success is evident from the fact that no warm wave has occurred in the East during the past summer without being indicated in advance and its duration foretold to within one day. This was true of the warm waves of July 9 to 10, July 20 to 23 (when the temperature went to 103° in Boston), August 1 to 2 and August 13 to 15. The cooler periods of July 14 to 15, August 1 to 2 and August 18 to 20 were also predicted to a day. The forecasts of the winter are proving equally satisfactory.

Forecasts of rainfall are more difficult owing to the fact that rainfall is more irregular and very subject to local influences; but rain has fallen more frequently on the days on which it was predicted than on other days, and that is all that can be said for any class of forecasts at the present time, even when they are made for only one day in advance.

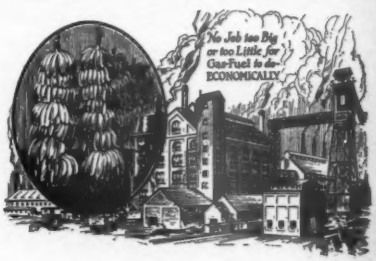
METHODS AND EXPECTED ACCURACY

Both seasonal and short-period forecasts of temperature are made—the seasonal forecasts in general terms and the others more specific.

Weather forecasts can not be made at present with absolute precision days, weeks or months in advance, like the prediction of eclipses. The farther ahead they are made the greater the indefiniteness in time and intensity. Around the time of maximum sunspots, for example, it is known that the weather tends to be colder. During the past 50 years in the United States a cold winter has occurred within one year of every sunspot maximum, but in one case it occurred the year before and in another case a year after the sunspot maximum, so that in forecasting an uncertainty of one year must be allowed and only then can the general character of the weather be outlined, as a cold winter, or a cold January.

For a week in advance the cold and mild periods can be outlined, but with an uncertainty of one day in time. For example, if a cold day is predicted for the 5th, the coldest may occur on the 4th or 6th. If forecasts were made for only a few hours in advance, then the maximum or minimum of temperature, or the beginning and ending of rain or snow, could be foretold generally within an hour.

There's **Romance** *in the* **Story of Gas as a Practical Fuel**



From Ripening Bananas
***to the* Greatest Industrial Uses**

Gas does wonders in the world's work! Fruit—shipped green from the sunny south—is ripened by exposure to gas in northern storehouses faster than by nature. Wherever heat is applied Gas Fuel is being utilized. Since gas *all* burns, and is instantly ready to give service or stop, it saves great fuel waste. It takes up al-

"Fuel by Pipe Line"

most no space and makes factory working conditions efficient in clean, comfortable surroundings.

In Boston more than 1600 industrial plants use gas for their heat supply. These users have found that the Boston Consolidated Gas Company makes better gas—more effectually than they can.

ASK THE INDUSTRIAL DEPARTMENT OF BOSTON'S GAS COMPANY HOW GAS FUEL IS HELPING ITSELF PRACTICAL FOR YOUR BUSINESS

GAS Boston Consolidated Gas Company **FUEL**

Specimen page of advertising appearing in magazine published at Mass. Institute of Technology. The copy of the Industrial Gas Section also appears in this college paper

Industrial Burner Ports, Manifold Pressures and Pipe Sizes

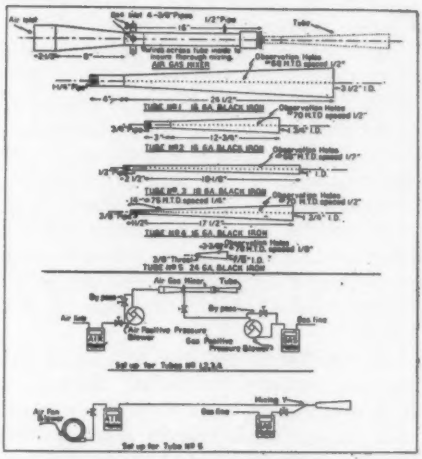
By J. D. VAN VALKENBURGH

Portland UTILIZATION LABORATORY PORTLAND GAS & COKE CO. Oregon

PART I—PORT SIZES FOR INDUSTRIAL BURNERS USING COMPLETE PREMIX OF 570 B.T.U. OIL GAS

THE design of industrial burners making use of complete manifold premixtures of gas with air remains an empirical process if the rate of flame propagation under different conditions of burning is unknown. Minimum manifold pressures and maximum allowable port areas are of great importance where it seems advisable or necessary to use mixtures at very low heads.

To resolve the design to a rational basis, it is then necessary to determine maximum rates of flame propagation for different rates of burning. To discover these rates, a series of tapered, internal combustion tubes were made, as may be noted in the drawing. Small observation holes were drilled at suitable intervals along the length of the tube in order to observe the point of burning. The accompanying table (at the bottom of the page) shows



analysis and combustion data for a sample gas differing but slightly from that used in test, and the sketches illustrate experimental arrangement.

Preliminary experiments showed that at mixtures approximating the theoretical

COMBUSTION DATA FOR 570 B.T.U. OIL-GAS

Average analysis, per cubic foot		CO_2 .009	C_2H_2 .002	C_2H_4 .050	O_2 .001	CO .062	H_2 .603	CH_4 .264	N_2 .009	*TOTAL* 1.00	*PER LB OF GAS*
Required for Combustion	O_2 cu. ft.	———	.015	.150	.001	.031	.302	.528	———	1.025	41.2
	Air cu. ft.				1.025				3.885	4.910	197.5
	Air lbs.				.08675				.28863	.37538	15.1
Wt. of gas, lbs. per cu. ft.		.00105	.00041	.00371	.00008	.00459	.00320	.01118	.00067	.02489	1.0
Wt. of gas-air mixture		.00105	.00041	.00371	.08683	.00459	.00320	.01118	.28930	.40027	16.1
Products of Combustion	H_2O Vol. cu. ft.	———	.006	.100	———	———	.603	.528	———	1.237	49.8
	" Wt. lbs.	———	.00028	.00476	———	———	.02871	.02514	———	.05889	2.36
	CO_2 vol. cu. ft.	.0090	.0120	.1000	———	.0620	———	.2640	———	.4470	18.09
	" wt. lbs.	.00105	.00140	.01164	———	.00721	———	.03072	———	.05202	2.0
	N_2 vol. cu. ft.								3.894	3.894	156.5
	" wt. lbs.								.28929	.28929	11.61
	Total cu. ft. dry	.0090	.0120	.1000	———	.0620	———	.2640	3.8940	4.3410	174.5
	" wt. "	.00105	.00140	.01164	———	.00721	———	.03072	.28929	.34131	13.70
	Total cu. ft. wet	.0090	.0180	.2000	———	.0602	.6030	.7920	3.8940	5.5780	224.3
	" wt. "	.00105	.00168	.01640	———	.00721	.02871	.05586	.28929	.40020	16.06
Gross B.t.u. Value		———	7.5	79.4	———	20.0	196.6	266.4	———	569.9	22,897
Latent heat loss		———	.3	5.4	———	———	32.2	28.2	———	66.1	2,656
Net B.t.u., 60 deg. F.		———	7.2	74.0	———	20.0	164.4	238.2	———	503.8	20,241
Specific Gravity		.0137	.0054	.0484	.0011	.0600	.0417	.1460	.0087	.3250	
Composition, % of wt.		4.22	1.66	14.89	0.34	18.45	12.83	44.93	2.68	100.00	
Cu. ft. per lb. of gas		.36	.08	2.01	.04	2.49	24.22	10.62	0.36	40.18	

ratio of five parts air to one of gas, blue combustion would take place in a form similar to that of a hemisphere at one reasonably steady location in the tube, for a given rate and mixture. Friction at the sides of the tube made velocity slower than mean at this surface and consequently the mixture would burn in this location nearer to the neck of the tube. Mixtures which differed greatly from the theoretical were observed to burn with much slower velocity. The tube was noted to become reddest at a point a few inches down from the brightest blue zone. On the neck side of the combustion sphere, little streamers of bright blue would shoot back into the incoming mixture and the more prominent of these streamers were accompanied by a sharp cracking noise, distinguishable above the roar of the burner.

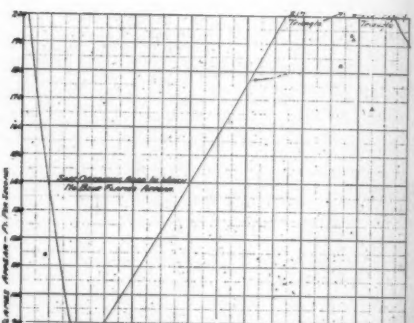
It would seem that the velocity of the gaseous mixture proceeding through a port would have to be somewhat greater than the maximum velocity at which blue flames appear in order to assure the prevention of backfiring into the manifold. Therefore, the following data were recorded on the set-up as shown and mean velocities computed for the smallest cross-section at which blue flames could be noted through the observation holes.

Results of experimental data computed as above are shown plotted on curve sheet No. 1, with different shaped points corresponding to the various experimental equipment used as noted. This curve shows maximum mixture velocity in the flame area versus rate of burning, in cubic feet of gas per hour.

Each of the trials made shows that maximum mixture velocity decreases from small rates of burning to a minimum at about 200 cu.ft. of gas per hour, after which it increases again very rapidly. Great care was used in checking to assure the accurate observation of this peculiar manifestation, and every trial showed the same characteristic.

From preliminary experiments not here recorded, and made before an approved method of observation was discovered, the indications were that "burning velocity" as shown by the portion of the tube which became reddest, would increase with growing acceleration from very small rates of burning to the maximum rates which could be handled by the experimental equipment available; also, the blue streamers observed during experimental work which serves as a basis for these inductions seemed to shoot back from the main zone of blue flame proportionately further into the tube in the case of lower rates of burning and higher rates of burning than for rates at about 200 cu.ft. per hour. This is accounted for by increased turbulency at these rates, in the first case because of small tube diameter and in the second because of high velocities.

Such a condition would make the maximum blue flame velocity decrease from low rates of burning until a minimum is reached, after which the maximum mixture velocity in which blue flames appear would increase. The trend of the curve


CURVE SHEET NUMBER ONE
POINT TUBE NUMBER ONE
TRIANGLE TUBE NUMBER TWO
CROSS TUBE NUMBER THREE
SQUARE TUBE NUMBER FOUR
CIRCLE TUBE NUMBER FIVE

Curve Sheet One

TUBE NO. 1

Gas, cu. ft./hr.	Air, cu. ft./hr.	Ratio, air to gas.	Vert. O. D., tube,"	Horiz. O. D., tube,"	Ave. O. D., tube,"	Ave. I. D., tube,"	Ave. I. D.²	Tube area ft.²	Ave. Vol. Mix, cu. ft./sec.	Flame veloc. ft./sec.
586	3275	5.59	1.720	1.715	1.718	1.593	2.54	.01385	1.070	77.3
597	3130	5.24	1.750	1.765	1.758	1.650	2.72	.01483	1.033	69.5
720	3130	4.35	1.810	1.685	2.840	1.685	2.84	.01545	1.072	69.4
663	3130	4.72	1.810	1.685	2.840	1.685	2.84	.01545	1.052	68.2
706	3130	4.43	1.750	1.765	1.758	1.650	2.72	.01483	1.063	71.6
583	3200	5.48	1.660	1.675	1.668	1.543	2.38	.01298	1.050	81.0
617	3000	4.86	1.660	1.675	1.668	1.543	2.38	.01298	1.003	77.4
617	3130	5.08	1.660	1.675	1.668	1.543	2.38	.01298	1.007	77.5
630	3080	4.88	1.660	1.675	1.668	1.543	2.38	.01298	1.030	79.5
617	3120	5.05	1.660	1.675	1.668	1.543	2.38	.01298	1.037	79.8
630	3130	4.97	1.660	1.675	1.668	1.543	2.38	.01298	1.045	80.6
799	4880	6.11	1.750	1.765	1.758	1.650	2.72	.01483	1.580	106.2
845	4800	5.68	1.720	1.715	1.718	1.593	2.54	.01385	1.570	113.2
913	4800	5.26	1.800	1.820	1.810	1.685	2.84	.01545	1.585	102.5
978	4640	4.75	1.800	1.820	1.810	1.685	2.84	.01545	1.560	101.0
904	4640	5.14	1.800	1.820	1.810	1.685	2.84	.01545	1.540	99.6
963	4640	4.82	1.750	1.765	1.758	1.650	2.72	.01483	1.560	105.0
952	4640	4.87	1.750	1.765	1.758	1.650	2.72	.01483	1.553	104.6
948	4640	4.90	1.750	1.765	1.758	1.650	2.72	.01483	1.553	104.6
942	4500	4.80	1.720	1.715	1.718	1.593	2.54	.01385	1.520	111.0
923	4800	5.20	1.750	1.765	1.758	1.650	2.72	.01483	1.590	107.0
973	4670	4.81	1.800	1.820	1.810	1.685	2.84	.01545	1.570	101.5
940	4640	4.94	1.750	1.765	1.758	1.650	2.72	.01483	1.550	104.5
940	4640	4.94	1.750	1.765	1.758	1.650	2.72	.01483	1.550	104.5
900	4565	5.07	1.750	1.765	1.758	1.633	2.67	.01456	1.517	104.2
942	4620	4.90	1.750	1.765	1.758	1.633	2.67	.01456	1.543	106.1
1092	6260	5.73	1.820	1.820	1.820	1.695	2.87	.01565	2.042	130.4
1254	6000	4.78	1.770	1.780	1.775	1.650	2.72	.01483	2.015	136.0
1200	6000	5.00	1.770	1.780	1.775	1.650	——	——	——	134.8
1200	5530	4.62	1.820	1.820	1.820	1.695	2.87	.01565	1.876	120.0
1180	5760	4.88	1.820	1.820	1.820	1.695	2.87	.01565	1.925	123.0
1200	6000	5.00	1.770	1.780	1.775	1.650	2.72	.01483	2.000	134.8
1200	6000	5.00	1.770	1.780	1.775	1.650	2.72	.01483	2.000	134.8

TUBE NO. 2

199.1	800	4.02	1.285	1.290	1.288	1.163	1.374	.00749	.2778	37.1
208.0	1310	6.30	1.370	1.420	1.395	1.270	1.612	.00880	.4220	48.0
207.8	1059	5.10	1.370	1.420	1.395	1.270	1.612	.00880	.3520	40.0
212.5	1059	4.99	1.370	1.420	1.395	1.270	1.612	.00880	.3535	40.2
210.8	1059	5.02	1.400	1.450	1.425	1.300	1.690	.00921	.3528	38.3
272.0	1500	5.52	1.450	1.505	1.478	1.353	1.832	.01000	.4930	49.3
279.0	1530	5.48	1.485	1.550	1.518	1.393	1.940	.01057	.5030	47.7
362.0	1564	4.32	1.655	1.700	1.678	1.553	2.415	.01317	.5355	40.65
317.5	1532	4.83	1.450	1.505	1.478	1.353	1.832	.01000	.5150	51.5
291.0	1565	5.38	1.530	1.590	1.560	1.435	2.060	.01123	.5160	45.9
319.4	1565	4.90	1.485	1.550	1.518	1.393	1.940	.01057	.5230	49.5
317.5	1565	4.93	1.485	1.550	1.518	1.393	1.940	.01057	.5230	49.5
313.0	1565	5.00	1.485	1.550	1.518	1.393	1.940	.01057	.5220	49.4
313.0	1565	5.00	1.530	1.590	1.560	1.435	2.060	.01123	.5220	46.4
343.0	2100	6.12	1.530	1.590	1.560	1.435	2.060	.01123	.6790	60.5
389.0	2000	5.15	1.450	1.505	1.478	1.353	1.835	.01000	.6640	66.4
452.	2000	4.425	1.450	1.505	1.478	1.353	1.835	.01000	.6820	68.2
448.	2116	4.72	1.400	1.450	1.425	1.300	1.690	.00921	.7130	77.5
441.	2116	5.03	1.350	1.380	1.365	1.240	1.535	.00837	.7375	88.0
457.	2116	4.63	1.370	1.420	1.395	1.270	1.612	.00880	.7140	81.2
433.	2180	5.03	1.400	1.450	1.425	1.300	1.690	.00921	.6930	75.3
439.	2180	4.97	1.370	1.420	1.395	1.270	1.612	.00880	.7280	82.8
450.	2215	4.92	1.370	1.420	1.395	1.270	1.612	.00880	.7400	84.1
1251.	5530	4.42	1.530	1.590	1.560	1.435	2.060	.01123	1.8800	167.3
1135.	5800	5.12	1.485	1.550	1.518	1.393	1.940	.01057	1.9300	182.6
1173.	5800	4.93	1.450	1.505	1.478	1.353	1.835	.01000	1.9350	193.5
1175.	5800	4.93	1.370	1.420	1.395	1.270	1.612	.00880	1.9350	220.0
1180.	5720	4.85	1.450	1.505	1.478	1.353	1.835	.01000	1.9200	192.0
1143.	5720	5.00	1.370	1.420	1.395	1.270	1.614	.00880	1.9050	216.7

TUBE NO. 3

79.6	511	6.42	.855	.850	.8525	.753	.567	.003090	.1641	53.1
87.0	500	5.75	.890	.890	.8900	.790	.623	.003395	.1632	48.1
88.3	507	5.73	.800	.810	.8050	.705	.497	.002706	.1652	61.0
87.9	506	5.76	.855	.850	.8525	.753	.567	.003090	.1650	53.4
88.0	468	5.32	.855	.850	.8525	.753	.567	.003090	.1545	50.0
91.8	432	4.70	.800	.810	.8050	.705	.497	.002706	.1453	53.6
87.8	462	5.63	.855	.850	.8525	.753	.567	.003090	.1618	52.3
88.5	432	4.99	.855	.850	.8530	.753	.567	.003090	.1472	47.7
87.8	456	5.18	.855	.850	.8530	.753	.567	.003090	.1509	48.8
139.8	511	3.68	1.305	1.290	1.297	1.197	1.433	.007810	.1817	23.2
108.8	511	4.70	.970	.970	.9700	.870	.757	.004125	.1896	46.0
104.0	508	4.88	.980	.980	.9800	.880	.773	.004220	.1700	40.2
103.1	498	4.83	.970	.970	.9700	.870	.757	.004125	.1671	40.5
126.0	523	4.15	1.015	1.015	1.0150	.915	.837	.004560	.1802	39.6
125.3	511	4.075	1.140	1.135	1.138	1.038	1.038	.005660	.1770	31.2

TUBE NO. 3 (*Continued*)

Gas, cu. ft./hr.	Air, cu. ft./hr.	Ratio, air to gas,	Vert. O. D., tube,"	Horiz. O. D., tube,"	Ave. O. D., tube,"	Ave. I. D., tube,"	Ave. I. D.²	Tube area ft.²	Ave. Vel. Mix, cu. ft./sec.	Flame veloc. ft./sec.
173.6	935	5.38	1.475	1.445	1.460	1.360	1.848	.010070	.3075	30.6
172.0	921	5.36	1.475	1.445	1.460	1.360	1.848	.010070	.3040	30.2
172.5	912	5.28	1.475	1.445	1.460	1.360	1.848	.010070	.3010	29.9
178.0	913	5.13	1.430	1.405	1.418	1.318	1.735	.009460	.3030	32.0
177.8	905	5.08	1.430	1.405	1.418	1.318	1.735	.009460	.3006	31.88
176.9	902	5.10	1.430	1.405	1.418	1.318	1.735	.009460	.2997	31.66
245.0	1272	5.11	1.780	1.770	1.775	1.675	2.805	.015300	.4160	27.2
262.0	1275	4.87	1.780	1.770	1.775	1.675	2.805	.015300	.4270	27.9
259.5	1275	4.92	1.820	1.810	1.815	1.715	2.940	.016020	.4270	26.6
248.5	1263	5.08	1.780	1.770	1.785	1.685	2.840	.015480	.4200	27.2
256.0	1270	4.97	1.735	1.735	1.735	1.635	2.670	.014550	.4240	29.2
253.5	1263	4.98	1.735	1.735	1.735	1.635	2.670	.014560	.4220	29.0
227.0	1385	6.11	1.780	1.770	1.775	1.675	2.805	.015300	.4480	29.2
240.0	1287	5.36	1.780	1.770	1.775	1.675	2.805	.015300	.4240	27.7
314.0	1222	3.82	1.780	1.770	1.775	1.675	2.805	.015300	.4210	27.5
274.0	1242	4.53	1.780	1.770	1.775	1.675	2.805	.015300	.4215	27.6
270.0	1264	4.68	1.780	1.770	1.775	1.675	2.805	.015300	.4270	27.9
260.	1242	4.78	1.750	1.725	1.738	1.635	2.670	.01456	.4175	28.70
254.	1250	4.93	1.715	1.685	1.700	1.600	2.560	.01396	.4180	29.95
255.	1260	4.94	1.715	1.685	1.700	1.600	2.560	.01396	.4210	30.15
251.	1272	5.07	1.750	1.725	1.738	1.638	2.680	.01461	.4230	28.95
251.	1277	5.08	1.750	1.725	1.738	1.638	2.680	.01461	.4250	29.06
251.	1282	5.11	1.750	1.725	1.738	1.638	2.680	.01461	.4260	29.10
					TUBE NO. 4					
86.7	679	7.83	.720	.700	.710	.585	.342	.001864	.2126	114.0
88.0	385	4.38	.705	.680	.693	.568	.322	.001755	.1316	75.0
84.0	383	4.56	.670	.650	.660	.535	.286	.001560	.1296	83.1
82.5	381	4.62	.670	.650	.660	.535	.286	.001560	.1288	82.6
76.7	379	4.94	.670	.650	.660	.535	.286	.001560	.1266	81.2
74.8	375	5.02	.650	.630	.640	.515	.265	.001445	.1251	83.7
75.6	377	4.98	.650	.630	.640	.515	.265	.001445	.1257	87.0
129.8	655	5.04	1.350	1.380	1.365	1.240	1.535	.008370	.2180	26.06
129.6	655	5.05	1.350	1.380	1.365	1.240	1.535	.008370	.2180	26.06
					TUBE NO. 5					
46.70	192.4	4.13	.505	.505	.505	.455	.2070	.001129	.0666	59.0
33.80	205.0	6.07	.480	.480	.480	.430	.1848	.001007	.0664	65.9
30.35	211.0	6.96	.480	.480	.480	.430	.1848	.001007	.0672	66.7
30.70	214.5	6.99	.480	.480	.480	.430	.1848	.001007	.0597	59.3
29.26	169.8	5.80	.450	.450	.450	.400	.1600	.000872	.0553	63.5
32.70	208.7	6.38	.465	.470	.4675	.418	.1743	.000950	.0670	70.5
46.20	232.4	5.03	.465	.470	.468	.418	.1750	.000954	.0774	81.2
35.80	236.5	6.60	.465	.470	.4675	.418	.1743	.000950	.0756	79.6
39.72	215.5	5.42	.505	.505	.505	.455	.2070	.001129	.0708	62.8
31.45	225.0	7.16	.505	.505	.505	.455	.2070	.001129	.0713	63.2
37.40	194.0	5.18	.505	.505	.505	.455	.2070	.001129	.0642	56.9
33.60	201.8	5.98	.505	.505	.505	.455	.2070	.001129	.0652	57.8
39.30	185.0	4.71	.480	.480	.480	.430	.1850	.001009	.0623	61.8
37.35	183.8	4.92	.480	.480	.480	.430	.1848	.001007	.0613	60.9
35.90	182.9	5.09	.480	.480	.480	.430	.1848	.001007	.06075	60.3
36.28	183.6	5.07	.480	.480	.480	.430	.1848	.001007	.0612	60.75
36.00	184.0	5.12	.480	.480	.480	.430	.1848	.001007	.0612	60.75
					TUBE NO. 2. *Special Trial					
					Horizontal					
191.0	1000	5.23	1.450	1.505	1.478	1.353	1.835	.01000	.3305	33.0
190.9	987	5.17	1.400	1.450	1.425	1.300	1.690	.00921	.3270	35.5
193.0	1000	5.18	1.400	1.450	1.425	1.300	1.690	.00921	.3314	36.0
195.0	1000	5.13	1.450	1.505	1.478	1.353	1.835	.01000	.3323	33.2
197.1	1000	5.075	1.400	1.450	1.425	1.300	1.690	.00921	.3326	36.1
198.1	994	5.02	1.400	1.450	1.425	1.300	1.690	.00921	.3318	36.0
					Tube Pointed Up					
196.5	994	5.06	1.450	1.505	1.478	1.353	1.835	.01000	.3310	33.10
196.5	994	5.06	1.450	1.505	1.478	1.353	1.835	.01000	.3310	33.10
					Tube Pointed Down					
200.8	994	4.95	1.450	1.505	1.478	1.353	1.835	.01000	.3318	33.20
194.0	986	5.08	1.400	1.450	1.425	1.300	1.690	.00921	.3278	35.58
					Horizontal Check					
198.1	990	4.99	1.450	1.505	1.478	1.353	1.835	.00921	.3300	35.80
197.1	995	5.04	1.400	1.450	1.425	1.300	1.690	.00921	.3310	35.90

*All tests were performed with combustion tube in horizontal position except the trial immediately above, where the tube was pointed up and down as noted, in order to see the effect on flame velocity, which proved to be negligible.

seems to lie in the direction of explosion wave velocity, which according to H. B. Dixon (1893) is of the order of one and one-half miles per second.

On curve sheet No. 1, a boundary of the safe operating area in which no blue flames appear is shown at a reasonable factor of safety above the points of possible combustion as discovered by test.

On curve sheet No. 2, inside tube diameters are plotted against mixture velocities and gas rate curves for five parts air to one of gas are superimposed according to the equation

$$X^2y = \frac{\text{gas rate} \times 4 \times 144 \times 6}{\pi \times 3600} = .305 \times \text{gas}$$

rate, where X is the abscissa and y the ordinate.

The boundary of the region safe from backfiring is plotted on Sheet No. 2 from Sheet No. 1 by reading velocities and gas rates. Instructions for using curve two are included on the sheet, and also a scale of total head manifold pressures for corresponding velocities is added with an assumed port coefficient of .8, according to the equation

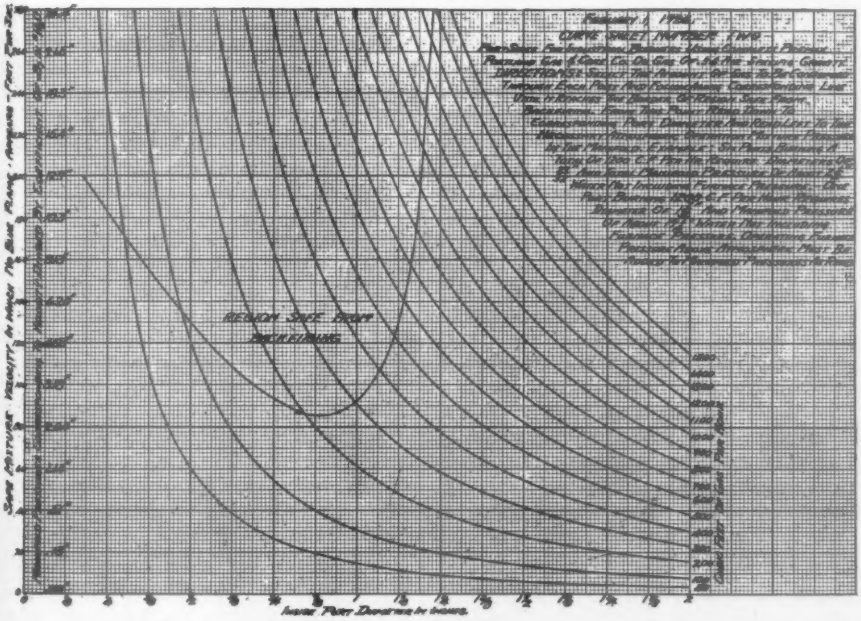
$$\sqrt{\text{Pressure in inches of water}} =$$

$$\frac{\sqrt{0.89} \times \text{vel. in ft./sec.}}{66.2 \times 0.8} = (0.01782 \times \text{Vel.})$$

where 0.89 is air density of mixture and 66.2 the theoretical velocity of air at a head of one inch of water.

Curve Sheet No. 2 is self-explanatory and should prove convenient for rapidly determining reasonable port sizes and operating mixture manifold pressures for gases of similar composition to that used in these experiments.

It should be noted, however, that the above figures apply only to the use of cold air and cold gas. In using preheated air, flame velocity increases rapidly with increase of preheat. All data were taken with blue hemisphere of flame burning at



Curve Sheet Two

very nearly atmospheric pressure, with a slight suction toward the neck of the tube and a slight pressure toward the outlet, which means that results may not be dependable at pressures differing greatly from atmospheric.

If mixture supply pipe of a furnace will be appreciably heated in operation, it should be provided with radiating fins. Burners should also be protected from heating and should be provided with some means of preventing the flame from blowing away from the tip. These considerations will be made the subject of further analysis.

Burners designed by making use of the above data should be protected in as far as possible from furnace heat radiated back into the advancing mixture, as this has the same tendency as preheating for increasing flame propagation. Since it is subject to so many variables and depends largely upon turbulency of the proceeding mixture, one should not be surprised to discover different flame velocities for different conditions of burning.

It is to be expected that the gas tested, being high in hydrogen content, would show a much greater flame velocity than the majority of fuel gases, for example blue water gas, which is high in carbon monoxide. According to one authority, flame propagation in carbon monoxide is only 20 per cent as fast as in hydrogen, and in methane, only 15 per cent as fast.

PART II

MANIFOLD SIZES FOR INDUSTRIAL BURNERS USING COMPLETE PREMIX OF LOW PRESSURE OIL GAS

Where gas is supplied at low pressures, and after allowable port areas and necessary manifold heads have been determined, the problem of pipe sizes and minimum air delivery pressures is logically the next consideration.

For the flow of gases in small pipes at low pressures, an equation has been developed on information prepared by the B. F. Sturtevant Company, which has very common application in gas practice. One form of this equation may be stated for air as follows:

$$\text{Cu.ft./min.} = 39.24 \sqrt{\frac{\text{Pres. drop in in. of water} \times \text{pipe dia. to fifth power}}{\text{Length of pipe in feet}}}$$

For present purposes, let the ensuing symbol be established:

- Q = cubic feet fuel gas to be burned per hour.
- h = total drop in inches of water pressure between air blower outlet and manifold port.
- H = total initial air head in inches of water when blower is delivering required amount of air.
- L_1 = equivalent length of air pipe in feet from blower to mixer.
- L_2 = equivalent length of manifold in feet from mixer to ports.
- a = that decimal part of h which occurs in L_1.
- b = that decimal part of h which occurs in mixer.
- c = that decimal part of h which occurs in manifold L_2.
- d = inside pipe diameter in inches, which is to be the same for air & mixture.

Three principal energy losses occur in the air piping and manifold:

1. Loss in air piping.
2. Loss in mixer.
3. Loss in mixture manifold.

For the loss (1) an equation may be written from the above

$$\frac{5Q}{60} = 39.24 \sqrt{\frac{(ah)\ d^5}{L_1}}$$

We may assume that loss (2) in a suitable mixer is equal to 0.2 of the kinetic energy of the air stream issuing from an orifice equal to 2/3 d.

$$\frac{62.5 \times 144}{1728 \times 0.07493} \times (bh) = \frac{0.2}{64.4} \left(\frac{5Q}{3600} \times \frac{4 \times 144}{(0.667d)^2 \pi} \right)^2$$

assuming air at 70 deg. F.

For loss (3) an expression similar to

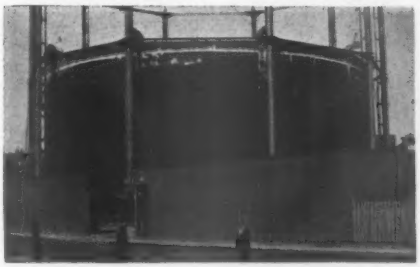
(Continued on page 253)

Repairing a Leak in a Danish Holder

Novel Method of Metal-Spraying Proves Especially Successful in Fixing Leaks in Sectional Holder

By A. RANLOV, B.Sc.
Asst. Engineer, Gas Works, Horsens, Denmark

IN 1924 our 215,000 cu.ft. two-lift gas holder, which is 30 years of age, was apparently hopelessly injured by rust at the uppermost row of rivets in the top-section. A repair in the usual way, by replacing defective plates, seemed impossible without landing the holder, and it would in all events be very expensive. It was decided then to try a new way, that of metal spraying. Working conditions made it necessary to undertake the repair while the holder was in service, on account of the small storage capacity.



The white stripe shows the tin-coated rivet seam

The corroded spots and strips were sandblasted in order to make them absolutely clean before the metal was applied. A 20 h.p. gas motor was employed to compress air to 85 lbs., the compressed air being directed around the holder through a two-inch pipe line, from which the sandblasting apparatus was fed by vertical pipes and rubber tubing. The sandblasting was performed by a man working on a scaffold suspended upon the top-lift, travelling up and down with it.

The sandblasting made a great many holes in the plates, where the corrosion had gone through, allowing small amounts of gas to escape. As quickly as possible the holes were filled with wooden plugs, the projecting woodtaps cut off by sawing and the surface of the remaining wood made as smooth as possible.

Having in this way cleaned the area within reach of the workman, zinc was sprayed upon the cleaned surface of the plates, covering the plates and the plugs with a thin zinc oxide, about 0.05 millimetres thick. The metal gun was equipped with a burner, which was supplied with gas at 45 lbs. pressure and compressed oxygen from steel bottles by means of rubber hoses and pipe lines. The zinc was provided as thread one to two millimetres in diameter, the uniform advance of which was secured by a little compressed air motor in the gun. In the gas-oxygen flame the zinc was melted and sprayed under the strain of the compressed air. When the zinc coating was applied it was immediately covered with a layer of tin sprayed upon in a thickness of two to three millimetres, rising to four to five millimetres over the wooden plugs. The rivet seams also were filled with tin.

PAINTING

When the repair was entirely completed, the holder was painted as usual, by paint spraying.

The labor was accomplished without troubles of any sort and the method has proved excellent. Careful examination shows today, two and a half years later, that the metal sprayed strips and spots still remain in the best of condition.

The method was later used for similar repairs of gas holders in Copenhagen, Holbaek and Esbjerg.

TIDE OF MEN AND AFFAIRS

W. C. Morris

BENJAMIN WHITELEY, treasurer, and W. CULLEN MORRIS, chief engineer, were elected vice-presidents of the Consolidated Gas Company of New York at a recent meeting of the Board of Trustees of the company. Both Mr. Whiteley and Mr. Morris will continue the duties of treasurer and chief engineer respectively. This fills the vacancy caused by the recent death of George E. Woods, a vice-president of the company.

Mr. Whitely entered the service of the Consolidated Gas Company of New York as assistant controller, and in 1901 he was appointed Treasurer of the United Electric Light & Power Company and the Brush Electric Illuminating Company, controller of the Standard Gas Light Company of the City of New York and the New Amsterdam Gas Company.

In 1902 he was appointed assistant treasurer of the Consolidated Gas Company of New York, vice-president of the United Electric Light & Power Company and treasurer of the Standard Gas Light Company of the City of New York.

Mr. Whiteley became assistant treasurer of the Astoria Light, Heat & Power Company in 1904, and in the same year secretary for the trustees of the Fire Insurance Fund. His appointment as vice-president of the Standard Company took place in 1906, and in 1913 he was made secretary of the Liability Insurance Fund.

In 1920 Mr. Whiteley was appointed treasurer of the Consolidated Gas Company of New York, and in 1925 treasurer of the Astoria Light, Heat and Power Company and the Tarrytown Terminal Corporation.

Mr. Morris was appointed assistant engineer of manufacture of the Consolidated Gas Company of New York in September, 1905, and in May, 1907, was appointed engineer of construction of the Consolidated Gas Company of New York and the Astoria Light, Heat & Power Company.

In January, 1922, he was made assistant chief engineer and on Nov. 1, 1924, he became chief engineer of the Consolidated Gas Company of New York and the Astoria Light, Heat & Power Company. On January 1, 1925, he was elected vice-president of the Astoria Light, Heat & Power Company and on July 15, 1925, was appointed consulting engineer of the New York & Queens Gas Company.

During his period of service Mr. Morris was in charge of the construction of the Astoria Tunnel, the erection of two water gas units at Astoria, the erection of the General Office Building, the maintenance of the various buildings of the company, and during the World War was in charge of Government operations under contract with the Consolidated Gas Company of New York for the manufacture of carbon and soda lime for gas masks.

Mr. Morris is a member of the American Society of Civil Engineers, American Society of Mechanical Engineers, American Gas Association, Illuminating Engineering Society, Society of Gas Lighting, Society of Gas Engineering of New York City, and the Society of American Military Engineers.

ALVA F. TRAVER, until recently connected with the utility division of Henry L. Doherty & Co., has taken charge of the engineering department of the Gas Utilities, Inc., of Columbus, Ohio. Mr. Traver is a graduate of the University of Michigan and was the second holder of the Gas Engineering Scholarship maintained at the University of Michigan by the Michigan Gas Associaton.

After leaving college he was employed by the Chattanooga Gas Company, Chattanooga, Tenn., and the Denver Gas and Electric Co., Denver, Col. During the war period he was vice-president and general manager of the Improved Equipment Corp. In 1921 he was assigned to the utility division of the Doherty organization.

MAJOR T. J. STRICKLER has been selected to succeed C. W. Green as vice-president and general manager of the Kansas City Gas Company. Mr. Green is to remain a director of the company. Major Strickler has had many years' experience in engineering and public utility work and was formerly chief engineer of the Kansas Public Utility Commission. Following service in the war Major Strickler joined the Henry L. Doherty forces in 1919.

E. P. DELANEY, who has been connected with J. B. Clow & Sons, is now representative for the Tinnerman Stove and Range Company, Cleveland, Ohio. Mr. Delaney will have charge of the metropolitan New York and New Jersey territory for the company. His office will be at 507 Fifth Ave., New York, N. Y.

CHARLES F. HENDERSON, formerly operating engineer in the Gas Department of the Toledo Edison Company, has been transferred to the Republic Light, Heat and Power Company, with main offices in Buffalo.

A. F. DAVEY, manager of the Wisconsin Public Service Corporation's properties at Sheboygan, Wis., has been named manager of the Sheboygan-Manitowoc division of the company, under a recent plan placing in effect a redistricting of the operating divisions. Mr. Davey will have jurisdiction over the electric and gas properties operated in the newly named division, as well as of transportation operations.

FREDERICK W. SCHMIDT, for nineteen years division agent of the Hudson division of the electric and gas departments of the Public Service Electric & Gas Company, Newark, N. J., has been appointed general agent of the company, a new position. Mr. Schmidt will have supervision over the entire commercial territory of the company, reporting directly to the vice-president in charge of finance. Mr. Schmidt started with the Jersey City Gas Light Company Jan. 8, 1896, as bookkeeper. In 1901 he was appointed agent at Jersey City of the Hudson County Gas Company, and division agent, gas department, Public Service, in 1903. He was made agent of the United Electric Company of New Jersey in 1904 and in 1908 was appointed division agent for both gas and electric departments of Public Service.

HARRY REID, who has been elected president of the National Electric Power Company, has been a prominent figure in public utility circles in Kentucky and the Middle West for twenty years. He entered the industry as an employee of the Fulton County Gas & Electric Company, Gloversville, N. Y., and after serving in various capacities, he, with several others, purchased the Versailles (Ky.) Electric Light Company. Mr. Reid became interested in syndicating a number of public utility companies in central Kentucky and later affiliated himself with the Kentucky Utilities Company, which was organized by the Insull interests, in the capacity of vice-president and general manager. In 1913 he was elected president and in 1917 he was elected to the presidency of the Interstate Public Service Company.

LEWIS B. HERRINGTON was chosen to succeed Mr. Reid as president of the company at the annual meeting of the company directors in March. Mr. Herrington will also become president of the Kentucky Hydro-Electric Company and Old Dominion Power Company when the directors meet. George T. Bogard has been named vice-president in charge of operations, and Arthur A. Tuttle vice-president and treasurer. Mr. Herrington has been connected with the company for twelve years. He has been vice-president and general manager since April, 1917. Mr. Bogard has been chief engineer since September, 1917, and Mr. Tuttle has been secretary and treasurer since February, 1914.

Alfred Fischer

ALFRED FISCHER, director of the Michigan Committee on Public Utility Information, Ann Arbor, Mich., since 1921, has resigned to join the staff of the Semet-Solvay Engineering Corporation, 61 Broadway, New York, N. Y. Previous to his connection with the Michigan Committee, Mr. Fischer was editor of the *Michigan Manufacturer and Financial Record*. He was also connected with the Associated Press for six years, and was on the staff of the *Detroit Free Press* as reporter and editor.

Mr. Fischer is well known to the gas industry through his work as director of the Michigan Committee.

R. A. SOVICK, who has been connected with the Central Hudson Gas and Electric Corp., Poughkeepsie, N. Y., is now affiliated with the Connecticut Light and Power Company, at Waterbury, Conn.

CONRAD A. METZNER, Acme Brass Works, Detroit, Mich., has resigned to join the Michigan Smelting and Refining Company, Detroit, Mich.

F. J. KELLEY, of the Standard Gas Light Company, New York, N. Y., has been transferred to the Consolidated Gas Company of New York.

MISS ANNA BARROWS, of Teacher's College, Columbia University, was the guest of the Brooklyn Union Gas Company at the Brooklyn Food Show the evening of March 11, where she held a reception.

In this way Miss Barrows had an opportunity to meet her Brooklyn radio audience. Every Wednesday morning Miss Barrows has been broadcasting lectures on home making, through station WEAF. This course of lectures is sponsored by The Gas Companies of Greater New York. Before visiting the show, Miss Barrows was entertained at dinner at the Hotel St. George, being the guest of the home service division of the company.

RUDOLPH WALKO, of the Astoria Light, Heat and Power Company, New York, N. Y., is now with the Consolidated Gas Company of New York.

R. E. POLK, Pittsburgh, Pa., has been made superintendent of the newly organized industrial and commercial gas sales department of the Equitable Gas Company of Pittsburgh. Mr. Polk will supervise all industrial and commercial gas and appliance sales for the company.

E. J. STEPHANY, Pittsburgh, Pa., has organized and been made superintendent of a new department with the Equitable Gas Company. This department will be know as the Domestic gas sales and service department. It will exercise general supervision over house heating, domestic appliance service, and give architects and builders service to the company.

A. A. OSTERMAN is now sales promotion supervisor for the Equitable Gas Company at Pittsburgh, Pa. Mr. Osterman was formerly office manager in the vice-president's office. H. K. Walker, who was chief clerk, has been made office manager.

FRANK B. HERTY, formerly secretary to Marcy L. Sperry, District Manager of Stone & Webster, Inc., is now student engineer at the Charles Street Plant of the Fall River Gas Works Co., Fall River, Mass.

He was graduated from Stevens Tech in 1922. He went to Boston immediately after his graduation to enter the Statistics Department of Stone & Webster, Inc. In 1923, he went to Haverhill, where he spent about two years in the plant of the Haverhill Gas Light Company. He returned to the Boston Office in 1925 to take over the duties of secretary to Mr. Sperry, in which position he served until his transfer to Fall River.

JAMES B. MCCABE, of Dallas, Texas, has been made vice-president of the Municipal Gas Company. Mr. McCabe will continue as general manager.

STEWART M. PRATT, who has been with the Public Service Electric and Gas Company, Newark, N. J., is now associated with the Brooklyn Edison Company, Brooklyn, N. Y.

HARRY ELLIS, with the Public Service Electric and Gas Company, Newark, N. J., has been transferred from the Camden office of the company to the Newark office.

JAMES H. GALT, of the Public Service Electric and Gas Company, Newark, N. J., has been transferred from the Trenton office of the company to the Camden office.

LEWIS C. KARRICK, associate refinery engineer, U. S. Bureau of Mines, Pittsburgh, Pa., can now be reached at Box 154, Salt Lake City, Utah.

FRANK ZOTTI, Jr., formerly with the Astoria Light, Heat and Power Company, Astoria, L. I., has been transferred to the Consolidated Gas Company of New York.

C. G. Milbourne

C. GORDON MILBOURNE, formerly engaged in research work upon water gas at the Experimental Station of E. I. DuPont de Nemours and Company, Henry Clay, Delaware, has resigned to enter upon graduate study and research in the Department of Gas Engineering, Johns Hopkins University. Mr. Milbourne is a graduate of that University, receiving the B.S. degree in 1925. His advanced study is made possible by a gift for research donated to the Department of Gas Engineering by Rufus C. Dawes of Chicago in cooperation with the Mobile Gas Company.

Denver Company Gets 20-Year Franchise

WITH a majority of almost three to one, the qualified electors of the City of Denver, Colorado, have granted a 20-year franchise to the Public Service Company of that State. The election was held on February 8, of the current year. The citizens of Denver gave an overwhelming majority in all of the 293 voting precincts of the city, with the exception of one which was a tie and a single other precinct which returned a majority of 13 votes against the franchise.

The interesting feature concerning this measure which was sought by the Public Service Company was the endorsement of all the members of the Denver council, including its mayor and city attorney. The Denver press unanimously extended its friendly cooperation to the company in a very enthusiastic way. Civic and commercial organizations were outspoken in its favor, as were the majority of civic leaders in the city. Prior to election day, Clare N. Stannard, vice-president and general manager, received hundreds of letters from business organizations and individuals throughout the city expressing their interest in the measure, their hope for its success, and their proffer of assistance in any way which would be valuable to the company.

Affiliated Association Activities

New England Gas Association

Wm. Gould

THE following officers were elected at the Convention of the New England Gas Association held in Worcester, Mass., on February 23rd and 24th; President, William Gould, Gas & Electric Improvement Company, Boston, Mass.; Vice-Presidents, G. W. Stiles, Portland Gas Light Company, Portland, Maine, and J. J. Quinn, Citizens Gas Light Company, Quincy, Mass.; Treasurer, F. D. Cadwallader, Boston, Mass. Directors, Alexander Macomber, Charlestown Gas & Electric Company, Charlestown, Mass., and Francis L. Ball, Fitchburg Gas & Electric Light Company, Fitchburg, Mass.

Mid-West Gas Association

ST. PAUL, Minnesota, will be the Mecca for the gas men, and also the ladies of the mid-west on April 20th, 21st, and 22nd, the occasion being the 22nd Annual Convention of the Mid-West Gas Association. That this will be the outstanding meeting in the history of the Association is assured. All arrangements have been made to give every visitor three of the best days he or she ever spent at a gas convention.

The program includes, in addition to various reports of committees, etc., the following persons who will address the convention:

G. O. House, genl. mgr., St. Paul Gas Co.; H. B. Maynard, secy., Central Iowa Power & Light Co.; W. E. Derwent, vice-pres., The Roper Corp.; F. A. Lemke, vice-pres., The Humphrey Co.; Dean Guy Stanton Ford, University of Minnesota; D. J. Young, pres., The Young-Whitwell Gas Process Co.; R. J. Canniff, western mgr., Standard Gas Equip. Corpn.; Geo. E. Whitwell, genl. mgr., Equitable Gas Co.; L. C. Hodgson, mayor, City of St. Paul; Alexander Forward, managing director, American Gas Association; Glen C. Carnahan, The Peoples Gas Light & Coke Co., Chicago, Ill.; Frank Milhollan, Pres., Board of Ry. Commissions, North Dakota; Mrs. Katherine Delaney, home service director, Wisconsin Public Service Co.; Miss Wylle McNeal, home economics dept., University of Minnesota; S. G. Pugsley, representing Geo. M. Clark Co.

Everyone connected with the gas industry, directly or indirectly, is invited to attend the Mid-West Gas Association Convention in St. Paul. Remember that the ladies are invited and that reservation should be made promptly with the St. Paul Hotel.

Missouri Association of Public Utilities

THE program for the annual convention of the Missouri Association of Public Utilities to be held in Cape Girardeau, Mo., May 5, 6, and 7 appeared in the March issue of THE MONTHLY. Prominent speakers on important subjects are included in this well-planned program.

Canadian Gas Association

THE Executive Committee of the Canadian Gas Association has arranged to hold the 20th Annual Convention in Toronto, Ontario, Thursday and Friday, June 16 and 17, 1927.

Wisconsin Utilities Association

A. A. Schuetz

ALL former records of this Association for attendance at Gas Section meetings were shattered when over 150 attended the Convention at Racine on February 24 and 25. Chairman Wagner ran the program strictly on schedule time, but all subjects were fully presented and discussed by a goodly number of well-qualified operators. The attendance throughout the sessions was excellent, and the papers and reports showed that a great deal of care and effort had gone into their preparation.

A. A. Schuetz, Milwaukee, was elected chairman of the Gas Section.

Mr. Callender, Mr. Sherman, and their associates arranged every detail of the entertainment and local arrangements most carefully; and everyone reported a most pleasant and profitable time.

The inspection trips and the dinner at the Country Club were very successful, and the men gathering for brief conversations between sessions and on the trips exchanged many valuable suggestions and experiences. There were plenty of chemistry and technical subjects discussed.

Executive Secretary Cadby states that the following papers are available upon request: "Liberation of Ammonia from Ammonia

Liquor by Various Limes" by Professor R. A. Ragatz and J. M. Spees.

"Liquid Purification" by J. E. Newton.

"Report of the Coke Committee" by A. F. Davey, Chairman.

"Bituminous Coal for the Manufacture of Water Gas" by Carl Hume.

"What the National Technical Section is Doing" by Chairman Walter C. Beckjord.

"Holder Heating" by H. E. Sweet.

"Gas for Industrial Use and for House Heating" by A. A. Schuetz.

The papers, "Dehydration" by Louis Stein, "Corrosion" by I. R. McCall, and "Distribution Problems" by W. H. Kemen will probably be available at some future date.

Pacific Coast Gas Association

R. M. McCalley
Chairman,
Technical Section,
P. C. G. A.

ANOTHER milestone in its year's progress was passed by the Pacific Coast Gas Association at its Southern Regional Conference held in Los Angeles on February 23 and 24. Attendance at the meeting was well over five hundred and included executives, accountants, commercial men, and engineers from all parts of the Pacific Coast.

The afternoon of the first day was devoted to a general meeting of all those in attendance, each section of the Association contributing one number of the program. The Accounting Section presented T. H. Ross, an industrial engineer of Los Angeles, who talked ably on the use of statistics in business. The Commercial Section presented D. J. Young of Tacoma who spoke on gas refrigeration. The Technical Section presented H. L. Masser, gas engineer of the Los Angeles Gas & Electric Corporation, who told of the difficulties the Los Angeles companies had met in changing over in January from a 850 B.t.u. mixed gas to straight natural gas service. The Public Relations Section presented a one-act playlette which showed the reaction of a new customer to prompt and efficient gas service. The playlette was written by Vernon Havenner, of the Los Angeles Gas & Electric Corporation, who also took a leading part in it.

On the evening of the same day business was forgotten and all members of the Association and their wives attended a dinner in the main dining room of the Chamber of Commerce which was followed by dancing.

The second day of the Conference was devoted to four parallel meetings of the sectional committee organization at which the problems assigned to committees were discussed. A transcript of these meetings was taken and will be supplied to all committee chairmen with a view to incorporating the ideas brought forth in discussion into their final reports which will be presented to the Association at its Convention in September.

The Pacific Coast Gas Association will hold its Northwest Regional Conference in Spokane, Washington, on May 6 and 7, with headquarters at the Hotel Davenport. W. S. Yard, President of the Association, will preside at the Conference and the occasion will be used by committee chairmen to finally consolidate their ideas in preparation for their Convention reports. In addition there will be a general session at which a number of topics of interest to companies in the Pacific Northwest will be discussed including the problem of meeting electric competition. This is especially serious in Washington and Oregon where hydroelectric development is advanced beyond its market possibilities causing the electric companies to fix rates which would appear ridiculously low to utility men in other parts of the country.

J. L. Stone, vice-president and general manager of the Spokane Gas & Fuel Company, and a director of the Association, is in charge of the local arrangements.

Southwestern Public Service Association

PLANS for the New Orleans convention of this Association, to be held April 26 and 27, include a playlette written by employees of the Dallas Power & Light Co., a dialogue arranged by the Woman's Committee, and a moving picture, all stressing public relations.

The gas section program includes the following subjects: refrigeration, pipe coverings, gas standards and services, education of employees, industrial heating, report on distribution conference, and the commercial problem.

The gas section will meet on the afternoons of the 27th and 28th, and possibly the 29th.

Other general subjects to be presented are: Women in Industry, by Ruth Phillips Steinhauser; Advertising, by Keith Clevenger, and Public Speaking, by W. S. Vivian.

The entertainment features of the program are especially attractive.

Pennsylvania Gas Association

THE 19th annual meeting of this association will be held in Philadelphia, April 6, at the Bellevue Stratford Hotel. This is the day before the Eastern States Gas Conference meets in the same hotel.

An exceptional program has been arranged. After a business session in the morning, a luncheon will be served to the members and their guests. In the afternoon discussions on merchandising, service to customers from a distribution viewpoint, and advertising will be heard.

ACCOUNTING SECTION
A. L. TOSSELL, Chairman EDWARD PORTER, Vice-Chairman
H. W. HARTMAN, Secretary

Portland Uses Meter Reading Tapes

Unique System Found to Be Efficient in Territory Served by Western Coast Company

By F. G. HAINES
Portland Gas and Coke Company, Portland, Oregon

MANY years ago the Portland Gas and Coke Company adopted the "tape" method of reading gas meters in preference to the "book reading" system. The two outstanding reasons for adopting the "tape" method (which merely consists of a double-width adding machine roll on which is printed the customer's name, address, and meter number from the addressograph plates each day) was that it proved to be more economical, and that it practically eliminated any fake or guess readings, as in the absence of previous readings it is impossible to guess a current month's consumption.

The addressograph plates from which the "tape" is printed are filed in the same geographical street order as our ledgers are in and all meter removal, set, change, lock and turn-on orders are applied daily, thereby keeping our meter reading media automatically up-to-date at all times.

OUTLYING TERRITORIES

Although the "tape" method is found to be more practical to our needs than the book reading system, it is not advisable to use it in the far outlying and some of the scattered territories which we serve. Therefore, we have individual slips of paper, three inches by seven inches, which are used in lieu of the "tape." The addressograph plates for this territory bear what is known as the "reading number" which permit sorting the printed slips in the logical order for reading. However, to make it possible to sort these slips back into ledger street address order after the readings have been secured, they are first numbered with a hand numbering machine and then sorted accordingly.

IMPORTANCE OF THE METER READING ROUTE BOOK

The controlling factor of the "tape" method is the meter reading route book, which contains a record of the various streets on which the meters are to be read each day by given routes. The entire territory served by us is divided into twelve separate routes, each route being divided into twenty-four days work, all of which is recorded in this book. Three copies of this route book are maintained. One is used by the addressograph clerk in "pulling" the plates from file for the printing of the "tape." The route clerk uses the second copy for cutting the tape into definite routes and for controlling the reading of the meters for even monthly periods, allowing approximately the same number daily, and also for noting on each route the premium data for the day. The third copy is kept for the use of the meter readers so that they can familiarize themselves with their routes. There is one meter reader assigned permanently to each of the twelve routes. This gives them the opportunity to confirm their premium data for the day.

Although at the present time we have only twelve routes, we employ fifteen men for the purpose of reading meters. These three extra men are called "fill-in"

Portland meter readers in their uniforms

meter readers as they are used to replace any of the regular meter readers who might be absent on account of illness or accident. These three men also help to keep the work up to date in case there may be fewer working days in the month. They are also used to deliver bills when necessary.

It is almost impossible for a meter reader to secure a reading on all meters listed on his day's tape on account of some of our customers not being home at the time of their call, particularly in the residential districts. The meter reader is, therefore, furnished with the following code and its interpretations:

L. C.: Leave card first call, consumer away all day; will mark card each month.

O. M.: Consumer reads own meter. If consumer is home, secure a reading if there is no objection.

B. D.: Beware of a vicious dog.

N. H.: Not home.

W. S.: Watch for gas steal.

N. E. S. W.: Abbreviations for north, east, south, and west, which indicate the side of the house that the meter can be read from through the window or other openings. Each meter reader is supplied with an information book in which this code is listed. Part of this code appears on the tape where special instructions are necessary.

These books are also used by the meter readers for noting any information pertaining to meters that may be difficult to locate. This information is very essential to a new man who may be assigned to any route.

In case a meter is read incorrectly or has been passed by the regular meter reader, a second call is made by our bill deliverer when delivering bills in the territory. If he fails to secure a reading, we are permitted to render, and sometimes do render, estimated bills; but these bills are never rendered more than twice until a regular reading has been secured.

Because a meter reader represents the company and, in some cases, is the company to our consumers, great stress is laid upon their actions while on the premises. They are also cautioned to be very accurate in securing the reading of the meters, thereby eliminating a great many high bill complaints and wrong readings, which eventually would result in losing the good will of the customer.

Our meter readers are paid a certain stated amount of salary, plus their bonus or premium.

The premium system was installed as an incentive for our men to turn in more

(Continued on page 240)

PUBLICITY AND ADVERTISING SECTION
HARLOW C. CLARK, Chairman E. FRANK GARDINER, Vice-Chairman
CHARLES W. PERSON, Secretary

"Everyday Magazine" Makes Debut

New England Gas Association Publishes Interesting Magazine for Member Companies' Customers

GAS service, the everyday friend in both homes and industrial plants, is now being brought to the attention of New England people through "Everyday Magazine," published by the New England Gas Association.

The magazine will entertainingly present from time to time the interesting story of gas service along with certain popular features. The first issue, published in March, is attractively arranged from a typographic viewpoint, and also is extremely well-balanced in contents. The titles of some of the articles are as follows: Taking the Drudge out of Drudgery, For the Glory of the Bean, Your Spring Gown Will Be Simple, A New View of Antiques, The Patriotic Luncheon, etc.

Front cover of the new 32-page magazine published by the N. E. Gas Ass'n

When actually concerned with the task of merging the New England Association of Gas Engineers, the Gas Sales Association of New England and the Industrial Gas Association, the men in the industry became more intimately acquainted with the needs of the business as the result of their many meetings, and worked out a plan of indirect advertising which they were confident would produce the results desired by all persons interested in the development of New England gas companies.

After a thorough investigation of different forms of advertising, it was the unanimous opinion of the committee that the best results could be accomplished by a properly-edited sales publication or co-operative house organ.

The value of such a medium is best proved by the fact that it is being used by the largest and most successful corporations in the United States.

By this plan the association has a publication of its own, whose editorial columns it controls. It can reach many customers with interesting matter pertaining to the use of gas, to the problems that confront gas companies, and at the same time acquaint them with the things gas companies have done and are doing to develop the various communities.

A special board of associate editors appointed by the New England Gas Association will work in an intimate way with the editor, Eugene M. Weeks, Everyday Publishing Co., 470 Atlantic Ave., Boston, Mass., so that the best interests of the gas companies will be served.

Advertisements Wanted for National Exhibition

AN unexcelled opportunity for displaying gas company advertisements to an audience of between 15,000 and 20,000 representative leaders of American business is afforded in the national advertising exhibition to be held in connection with the Denver, Colo., convention of the International Advertising Association, in June, 1927.

An exhibition of public utility advertisements is to be held under the auspices of the Public Utilities Advertising Association, which is a departmental of the International Advertising Association. The display of utility advertisements at the Philadelphia, Pa., convention last year was the largest in the hall. This year the committee is hoping to dominate the entire exhibition with the most effective exhibit of public utility advertising ever held.

Through the courtesy of the three national utility associations all expenses in connection with the exhibit will be underwritten. The only expense to those wishing to participate, in behalf of their company and its advertising, is the mailing of proofs to Henry Obermeyer, secretary, Public Utilities Advertising Ass'n, 130 East 15th St., New York, N. Y.

Gas company advertising is to be exhibited in a section by itself. It is a golden opportunity to show the advertising man what the gas industry is doing. The chairman hopes every company that advertises will submit specimens, both for the good of the industry and the individual companies.

The following are requested especially:

1. Newspaper and magazine advertisements, on coated paper.
2. Direct-by-mail literature, letters, pamphlets, booklets, etc.
3. Photographs of billboard displays.
4. Posters, street car cards, and other display material.
5. Annual reports and year books, *especially proofs of color cuts.*

All material submitted will be returned on request.

Joe Carmichael, director, Iowa Committee on Public Utility Information, Des Moines, Ia., is chairman of the Exhibits Committee.

Portland Uses Tapes

(Continued from page 238)

readings per day, affording them the opportunity to increase their monthly earnings if they desire to put forth the extra effort.

This system is not only beneficial to the men but is also of value to the Company, as it has made possible the reading of an even number of meters each day, which makes the volume of work throughout the office uniform, It also helps to eliminate wrong readings.

The standards for the premium system are based upon the previous performance on various routes properly checked. The average standard is 200 meters per day, on which a premium of one cent is paid for each meter read over that standard. Of course, the standard and premium varies in the districts that are sparsely or thickly settled.

If a meter reader reads less than the standard in a given day, the number of meters short his standard counts as a deduction from the premium earned.

For each meter skipped (not read) over and above the number allowed, a penalty of two cents is deducted from the premium earned, and for all meters read incorrectly a penalty of three cents is made. On re-reads a penalty of four cents is deducted.

In the event that the deductions for not reading the route standard and penalty for skips and wrong readings should exceed the premium earned, the guaranteed salary is in no way affected. Nor are such penalties carried from one month to another.

In connection with the work of meter reading we have found it very practical to have our men wear khaki uniforms and caps of the same material, leather puttees, and a company badge. This enables our customers to recognize our men immediately, thereby willingly admitting them to their homes. It also gives the men a neat and clean appearance. To provide and maintain these uniforms, caps, and puttees, each meter reader is given an allowance in addition to his regular salary and bonus. This system has proved to be very satisfactory to all concerned.

MANUFACTURERS SECTION

W. E. STEINWEDELL, Chairman H. L. WHITELAW, Vice-Chairman
C. W. BERGHORN, Secretary

The Blue Star Seal Means Better Business

Laboratory Approved Appliances as Viewed by a Gas Man

By C. F. SHEPARD
The Central Hudson Gas & Electric Corp.

WITH the publication during February of a series of widely distributed newspaper advertisements, the Central Hudson Gas & Electric Corporation took its first step in selling the full meaning and importance of the Blue Star seal to its public. The February issue of our monthly house organ *Central Hudson Progress,* a copy of which reaches every consumer on our mains, told a brief story of the laboratory and how it will function to protect the users of gas appliances in our territory.

The Blue Star emblem now appears on the space heaters and ranges sold from our stock rooms and floor displays, and our appliance salesmen are telling the story in all of their daily calls on prospects.

A Certified Gas Appliance Is Like a Certified Check

A certified check! Good as gold; accepted without question; a token of value; secure, too.

There are some of the things one thinks of when he sees the impressive certification by a bank on the face of a check.

A certified gas range! That is what the Blue Star stands for. The Blue Star is an assurance that there has been built into the range—quality, safety, efficiency and character—and this is true of any gas burning appliance displaying the Blue Star.

The Blue Star Seal of approval means that the appliance has been subjected to the closest scrutiny in the Testing Laboratory of the American Gas Association. It has been tested, weighed in the balance as it were, and has not been found wanting.

Insist upon the Blue Star as an evidence of quality, when you buy gas burning appliances. It is your insurance against inferiority.

The Central Hudson Gas & Electric Corporation sells only gas appliances that have earned the Blue Star of approval.

Central Hudson Gas & Electric Corporation

ADDRESS PHONE

THIS article, written from the point of view of the gas company, is especially pertinent to manufacturer companies. It demonstrates the merchandising advantages of the Blue Star Seal, a subject in which both the gas companies and the manufacturers of appliances are interested.—EDITOR

Although it is too early as yet to expect any definite reaction from this publicity, our company expects to capitalize on the Blue Star seal in a number of different ways. No doubt the greatest benefit will come through the strengthening of the public confidence that we have for years been steadily building up through our efforts to render adequate and dependable service, to charge reasonable and equitable rates, to make prompt adjustment of complaints, and to give courteous treatment. These have all been factors in bringing about the realization that our organization has faithfully endeavored to be worthy of its position as a public servant to the homes and industries of the Central Hudson Valley. Now that the American Gas Association Testing Laboratory is providing us with a guide in the selection of merchandise, we are in a better position than ever before to assure our customers that the media through which they use our product are safe and efficient and will give them the full value of the gas they buy.

After all, the gas company in any community is the final consultant in gas matters. People seek advice from it wherever the use of gas is involved. Is it not important, therefore, that every utility company should be able to talk to its customers with understanding and confidence about the appliances with which their meals are cooked, their water heated, and their homes made warm and comfortable?

Although it has always been our purpose to offer only a very high grade of merchandise, our only guide in determining its quality was our own experience and investigation. Henceforth, however, when we sell a range, water heater or any

other piece of merchandise, we can be sure that it will do all we claim for it, because its merit has been proved by exhaustive, painstaking tests. Later when the purchaser finds through actual use that his expectations have been justified, he will look with more favor upon our wares and methods of doing business, and when we try to interest him in some additional use of gas for his household, he will not turn a deaf ear.

This suggests another benefit we expect to derive through the sale of Blue Star merchandise, namely, the development of greater confidence on the part of our sales force in the goods they sell and a consequent improvement in the calibre of the personnel. During the last few years, our commercial department has made a consistent effort to enlist the services of the best type of salesmen available—men who could truly be called representative of the organization and not mere appliance canvassers.

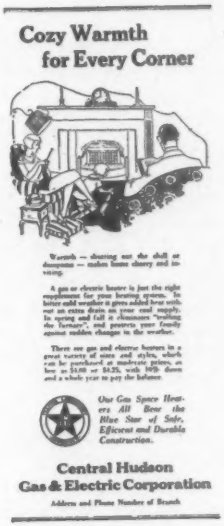
A new plan of compensation, initiated last August, wherein a salary plus commission on merchandise and load building took the place of a straight commission, was one of the means adopted to attract high grade men. Now that the salesmen can go out with merchandise of a standard vouchsafed by the Blue Star, selling arguments will ring with a conviction that no amount of "pep talk" could instill. The man who insists on believing in what he is selling will prefer to join the ranks of an organization that offers its customers only the best in equipment and service. An honorable salesman is satisfied with selling only goods that merit his own enthusiasm, goods that will make of his customer a friend and a booster—and that is the only kind of salesman our industry can afford to employ.

Stressing laboratory-approved merchandise should result in reducing the number of minor service complaints through eliminating the necessity for many petty adjustments. Of course, even the best appliances cannot be absolutely fool proof or stand up under the years of daily usage without some attention, but experience has taught us that many of our customers' "gas ills," particularly the domestic ones, are directly traceable to defects inherent in carelessly constructed appliances.

The unfortunate part of it is that whether an appliance is bought from a department store, a plumber, a mail-order house, or from our own sales floor, the owner will almost invariably appeal to us when the time for servicing comes, and, what is more deplorable, he is often inclined to forget that his own doorstep may be somewhat soiled. Instead he will tell his friends how "rotten" the gas is and how ashamed we ought to be of giving such service.

If, however, through intelligent advertising and other means this same customer is taught consistently that more often than not he is suffering simply because his own appliance is at fault, and if he is encouraged to provide himself with equipment that will consistently do the job demanded of it, he will not only have less cause for complaint but will be more inclined to respect the quality of the gas company's service.

Our commercial department at the present time is working on a cooperative merchandising setup with the plumbers, whereby the latter, through our carrying the accounts, will be enabled to sell gas appliances on the same terms we offer. As a feature of this plan, the plumbers will be encouraged to stock only such appliances as have met with Laboratory approval. No one who insists on dealing in inferior merchandise can expect to take advantage of this cooperative agreement. As the plumbing fraternity probably sells a greater volume of appliances than any other agency in our territory, with the exception of ourselves, we feel that it can do much toward establishing a high standard for gas equipment.



Interesting advertisements stressing the idea of Blue Star appliances

Another way in which we intend to capitalize the Blue Star Seal is in the development of the Blue Star Plan, as applied to home building. More and more our industry is realizing the necessity for building up in the public mind a sort of "unit consciousness" in the purchase of gas equipment. Builders of new homes particularly should be educated to the advantage of providing at the start all the comforts that gas service can furnish. A prospective home builder should no more think of installing his gas equipment piece-meal than he would of first putting in the kitchen sink, then a few years later a garden hose faucet and possibly some time after that a bathroom. When builders are educated to the point of planning their homes with complete gas installations, we shall have less worry over load building and the general outlook for our business. But they are not likely to exhibit such a tendency until they know that every appliance put into the home can be used with safety and satisfaction.

In the popularization of gas for house heating, the Blue Star equipment should play a prominent part. This most important usage of our product, despite its load building possibilities and the great field before it, has not as yet been thoroughly sold to the public in all sections where only manufactured gas is available. Much of an educational nature remains to be done. Although it will be the job of utility salesmen to put house heating across, public approval and enthusiasm will be built largely on the recommendations of satisfied users, because of the high installation costs and the expense of operation. Before a house owner will invest several hundred dollars in equipment and face the prospect of spending a sizeable sum each month for fuel bills, he will want to know from the experience of others that he can expect a safe, economical and thoroughly efficient job; and the job can be neither safe, economical nor efficient unless the equipment plays a big part in making it so.

Sky-Writing Came High Fifty Years Ago

THE thirteenth day of September, 1856, was a big day for the gas company at Madison, Wisc. One of the old record books of the company has the following entry for that date:

"12,000 cu.ft. supplied for ballon ascension." The simplified spelling is given as it appears in the entry. Reference to newspapers reveals the fact that S. M. Brooks, "the celebrated aeronaut," went up in his mammoth balloon, "The Hercules." Balloon ascensions came high in those days. At that time gas cost $3.50 a thousand cubic feet, and the transportation charges against Mr. Brooks amounted to $42. Today the trip would cost him $11.60.

House Heating at a Profit

(Continued from page 212)

Master Plumbers are made at twenty per cent from List Thirty Days Net.

(3) Either sixty-day or fifteen-month accounts on which fifteen per cent commission is given to the Master Plumber in addition to a contract on construction.

(4) Open account sales to Sheet Metal Shops on furnaces at twenty per cent from List Thirty Days Net.

(5) Sixty-day or fifteen-month accounts on which ten per cent commission is given to the Sheet Metal Shop in addition to a contract on the construction.

(6) A margin of protection to the Plumbing Jobber equal to one-half of whatever we have left after taking care of the Master Plumber.

Under this plan everyone may profit: The Master Plumber, through the efforts of our salesmen and the Utility, due to the cooperation to be expected from a hundred dealers, most of whom display the cooperative Dayton Power and Light Company show window card perhaps together with a boiler and in every case distribute to their trade literature developed by our company. Even our Spring Campaign includes $200, freely contributed for our advertising by our friend, the Master Plumber.

It costs money to sell *House Heating*, but your sales resistance will be decreased through the adoption of a liberal policy toward your local dealer.

There is the situation as we see it out here in Dayton, Ohio. It is more or less on paper but not entirely visionary as the writer worked out the details long ago when in Poughkeepsie. The field is larger but the problem the same.

Our own set-up for 1927 is about as follows:

Budget of 200 Boilers or Furnaces			$40,500.00
Gross Revenue			
50 Boilers or Furnaces at Retail		$15,000.00	
Commission to Dealers (10 or 15%)			1,750.00
50 Boilers or Furnaces on Open Acct. to Heating Contractors (20%)		12,000.00	
80 Boilers or Furnaces on Time Payments to Consumers		25,200.00	
Commission to Dealers (10 or 15%)			2,850.00
20 Boilers to Jobbers (20 & 7½%)		4,440.00	
Total Merchandise Sales		$56,640.00	$45,100.00
Estimated Margin	$11,540.00		
Bad Accounts, Handling, etc.	1,540.00		
Credited to Sales Promotion Expense		$10,000.00	
Estimated value of promotion based on 20c per M cu. ft. margin on 40,000 M cu. ft.		8,000.00	
Total Value of Promotion		$18,000.00	
Cost of Promotion			
Publicity and Printing	$ 5,000.00		
Sales Expense	8,000.00	$13,000.00	
Net Profit from Operations		$ 5,000.00	

INDUSTRIAL GAS SECTION

H. O. LOEBELL, Chairman F. C. MACKEY, Vice-Chairman

C. W. BERGHORN, Secretary

1927 Industrial Advertising Under Way

Copy Stressing Advantages of Industrial Gas to Appear in 27 National Trade and Class Publications

THE March issues of 27 national trade and class publications carried the first advertisement in the 1927 advertising program of the Industrial Gas Section. The program, laid out along most comprehensive lines, follows closely the program the past two years.

The 1926 program, which ended with the insertion in the February magazines, was very successful, more than 10,000 copies of the booklet, "Gas, the Ideal Factory Fuel," having been distributed. Various local gas companies gave the program splendid support, by running matrices of the national advertisements over the company name in the local newspapers at the time the national magazines were being circulated. More than 30 companies ordered a total of 310 mats.

The FUEL
in step with
Hand-to-Mouth Buying
A prominent business economist states that one of the notable developments in industry during 1926 was the growth of hand-to-mouth buying—turnover of capital.
No dividend was ever paid on an idle inventory! And least profitable of all inventories is an inventory of fuel.
Why tie up capital in a fuel supply? Your gas company will supply the ideal fuel—gas—when and as you want it.
Your Advantages of Gas
Dependable—any time, any place, any quantity.
Controllable—exact temperatures, automatically controlled.
Economical—lowest fuel cost per unit of production.
Clean—comfortable factory working conditions.
Gas is the "hand-to-mouth" fuel—the fuel that's in step with modern business methods. It is delivered as required, at the burner—available in the exact quantities to meet your daily and hourly needs. You pay nothing for gas until it has been consumed.
Find out what gas is doing for other companies in your line of business. Write to
American Gas Association
342 Madison Avenue ∴ New York City
Send today for our interesting book, "Gas—the Ideal Factory Fuel"
YOU CAN DO IT BETTER WITH GAS

The May advertisement

While the advertising expenditures of the Industrial Gas Section are limited, those in charge have planned a program that conforms to modern advertising procedure in every way. The national copy is designed to interest the manufacturer-prospect through his trade papers, the booklet is to give him more detail, and the local newspaper advertisements are to show him that his local gas company is able to satisfy his requirements.

The program works out materially as follows:

The manufacturer's attention is caught by the national message describing the general advantages of gas fuel. He writes to A. G. A. Headquarters for "Gas—the Ideal Factory Fuel"—and again he is the recipient of general data on gas fuel. Up to this point he has received no specific information applicable to his own individual fuel requirements. A few days later, however, he sees in his local paper the advertisement of his gas company with the request that he write or telephone the company for further information. Immediately he connects the trade paper message with the message carried in his home paper and knows that the gas company is personally interested in getting his business. In the meantime, the Association has forwarded his name to the gas company and a representative calls on him—perhaps

before he has communicated with the company. Thus the sales follow-up is complete, the gas holder in the trade paper advertisement turning out to be the gas holder in his own town.

The mats of the advertisements are available in two sizes, three or five column. Orders for mats should be sent to Association headquarters.

The list of trade papers that are carrying the industrial gas advertisements for 1927 are:

Chemical and Metallurgical Engineering, Electrical World, Baker's Weekly, National Provisioner, Journal of the American Ceramic Society, American Machinist, Forging-Stamping-Heat Treating, Foundry, Fuels and Furnaces, Iron Trade Review, Iron Age, Transactions of American Society for Steel Treating, Editor and Publisher, Industrial Gas, Industrial Power, Manufacturers Record, Ceramic Industry, Metal Industry, Inland Printer, Nation's Business, and American Restaurant.

The following college publications are also included:

Technical Engineering News, Massachusetts Institute of Technology; Tarton, University of Pittsburgh; Michigan Technic, University of Michigan; News Letter, John Hopkins University; and Ohio State Engineer, Ohio State University.

COMPANY CHANGES

CONSOLIDATION of six Georgia public utility companies into the Georgia Power Company was completed here recently. Simultaneously with the granting of the charter the Georgia Power Company acquires title to and control of properties formerly operated by the Athens Railway and Electric Company; Georgia Railway and Electric Company; Georgia Railway and Power Company; East Georgia Power Company; Rome Railway and Light Company and the constituent Georgia Power Company, the last named including properties formerly belonging to the Athens Gas Light and Fuel Company, Georgia Southern Power Company, Georgia Utilities Company and Milledgeville Lighting Company.

In addition to the above companies subsidiaries of the new company include the Central Georgia Power Company, Macon Railway and Light Company, and Macon Gas Company serving the Macon district, the Mutual Light and Water Company, operating in Brunswick, and a number of others.

Officers of the new company, as designated in the charter, are: H. M. Atkinson, chairman of the board; P. S. Arkwright, president; G. W. Brine, Charles G. Adsit, F. L. Butler and F. P. Cummings, vice-presidents; W. H. Wright, secretary; I. S. Mitchell, Jr., treasurer; F. R. Mitchell, assistant treasurer; B. T. Simpson, assistant secretary and Stephen A. Dawley, assistant secretary.

MAGNO-PRODUCTS has moved from 315-321 East 97th Street, New York, N. Y., to 344 East 32nd Street, New York.

THE POUDRE VALLEY GAS CO., Fort Collins, Colo., is now known as the Public Service Co. of Colo.

THE CHARLESTON CONSOLIDATED RAILWAY AND LIGHTING COMPANY, Charleston, S. C., has changed its name to the South Carolina Power Company.

THE ALTON GAS AND ELECTRIC CO., Alton, Ill., is now known as the Alton Gas Co.

THE ABERDEEN GAS CO., Aberdeen, S. D., is now known as the Northwestern Public Service Co.

THE NILES GAS LIGHT CO., Niles, Mich., has changed its name to the Michigan Gas and Electric Co.

THE NORTHEASTERN OIL AND GAS CO., Conneaut, O., is now the Lake Shore Gas Co.

IOWA SOUTHERN UTILITIES COMPANY, Burlington, Ia., is the new name of the Burlington Gas Light Co.

THE RICHMOND LIGHT, HEAT AND POWER Co., Richmond, Ind., is now known as the Indiana Gas Utilities Co.

THE KANSAS PUBLIC SERVICE CO., Topeka, Kan., is now the Kansas Power and Light Co.

THE DES MOINES ELECTRIC LIGHT CO., Des Moines, Ia., has changed its name to the Iowa Power and Light Co.

THE NATIONAL REFRIGERATING COMPANY, 275 Winchester Ave., New Haven, Conn., has moved to 125 Munson Street, same city.

THE C. L. BRYANT CORP., Cleveland, Ohio, is now known as the B-Line Boiler Company, Detroit, Mich.

A. B. DAY, vice-president and general manager of the Los Angeles Gas and Electric Corp., Los Angeles, Calif., is now executive vice-president and general manager.

COMMERCIAL SECTION
J. J. BURNS, Chairman G. M. KARSHNER, Vice-Chairman
J. W. WEST, Jr., Secretary

The Summer Slump—In Memoriam

A Quick Jab by an Alert Sales Department Proves Fatal to the Bogey of the Warm Months

By S. L. DRUMM
New Orleans Public Service, Inc.

IT can't be done—nobody does much business in the summer—it's a natural slump period." How often have you heard such a remark or remarks to the same effect? Indeed, they are too prevalent among business men and it is a known psychological fact that there will be an adverse reaction to most men—at least in nine cases out of ten.

"The summer slump"—then becomes nothing more than a "state of mind." There is no good reason why there should be less gas merchandise sold by a gas company in summer than in winter. There are many reasons put forth that are accepted by some—who take the "summer slump" as a natural annual occurence—but when careful thought is given this most important question, there is no doubt that the real business man will put summer sales over just the same as winter sales.

It is quite true that summer is vacationing time, but what percentage of the people spend more than two weeks away from home? Further than that, the great "mass" who compose a large percentage of the buying public are in a great majority of cases unable to leave home on their vacations at all. An automobile is being bought for the family—modern conveniences have become the vogue—the salaried man of moderate circumstances wants a gas range, a gas laundry stove and a gas water heater just the same as his more fortunate wealthy neighbor. You can reach this man in the summer just the same as in the winter—and don't forget he makes up a large percentage of the "buying public."

EDITOR'S NOTE

IN April the dangers of the summer slump may not seem as important as they will in July and August. However, it is absolutely necessary to lay plans in the spring in order to eliminate the recurrence of the slump in mid-summer sales. With this in mind, this article, by S. L. Drumm, will prove interesting to those who have the worries and problems of the sales department on their shoulders.

The above is theory you say. Well probably it is—but when it has been proved that the theory has actually worked out in practice, then the theory must be a fact. Geometrically speaking, "Q.E.D." To put the above theory into practice requires a live, wide awake sales organization with a keen-minded sales manager at the helm. The organization which has all the above requisites is the gas commerical department of the New Orleans Public Service, Inc. Their plan of attack to kill the "summer slump" is outlined in the following paragraphs.

Summer comprises the three months of June, July and August. As far as the writer has been able to ascertain the month of August causes more worry to the sales managers than any other, and consequently leads the other two as champions of the "Summer Slump" period. With this in mind E. N. Avegno, assistant commercial manager of the New Orleans Public Service Inc., in charge of the gas commercial department, decided that August was the month on which to concentrate. August being the hottest month of the year, it was decided to put

on a water heater campaign. Hot water in hot weather—impossible! But—no—the campaign was planned. Fifteen thousand attractive folders were sent to those families who did not have a water heating appliance in their home. The opening line of the folder advertisement, "95 cents puts this hot water heater in your home," immediately caught the eye. In the street cars folders were put in the little racks beside each seat. A large placard was put at the front and rear of each car explaining this unusual offer for the month of August. The windows were appropriately decorated. On sales floor water heaters were displayed. The salesmen were thoroughly schooled in the selling of water heaters, and as an added incentive special prizes were offered to the salesmen who made the best record.

On August 1st the big sale began. It was to last for one month only. Orders came in slowly at first, but like a snowball rolling from the top of a hill (a pleasant thought for summer), momentum was gathered with each day and the clerical force was kept busy issuing installation orders.

In the meantime, however, Friday, August 13th, was approaching. The assistant commercial manager had a particular fancy for this day and as a result one of his famous "Friday the 13th" sales was put on for ranges. The sale began Monday, August 9th and ended Friday, August 13th. The offers on gas ranges for this period were: 13 cents down, 13 months to pay, 13 per cent discount, 13 feet free piping.

People began to swarm into the store. The outside salesmen wanted the working day extended. It was the peppiest period of the whole year. The old "manana" fever prevalent in New Orleans during the summer had no victims in the gas commercial department. Enthusiasm kept up until the last day of the month, and everybody was happy.

Had summer sales been boosted? Had the summer slump been overcome? The following record of the gas commercial department for each month during 1926 speaks for itself.

	Ranges	*Water Heaters*
January	241	51
February	182	28
March	270	45
April	258	28
May	208	23
June	196	11
July	300	21
August	382	295

Course in Fuel Engineering

(Continued from page 198)

Distribution—Low Pressure, by A. M. Boyd, engineer of distribution, The United Gas Improvement Contracting Company, Philadelphia, Pa.

Safety, by O. H. Fogg, vice-president, Consolidated Gas Company of New York, N. Y.

Uses of Gaseous Fuels and Specifications for Purchase, by H. O. Loebell, vice-president, Combustion Utilities Corporation, New York.

Furnaces for Gas, by W. M. Hepburn, vice-president, Combustion Utilities Corporation, New York.

Domestic Heating with Oil, Gas or Electricity, by N. T. Sellman, engineer of utilization, Consolidated Gas Company of New York.

Gas vs. Electricity for Cooking, by R. M. Conner, director A. G. A. Testing Laboratory, Cleveland, Ohio.

The enthusiastic interest in the extraordinary International Conference on Bituminous Coal in November, 1926, under the auspices of the Carnegie Institute of Technology demonstrated clearly the necessity of graduate and research work in fuel engineering in the United States.

The Mechanical Engineering Department, Towne Scientific School, University of Pennsylvania, for some time past the center of extensive fuel investigations, situated near the mines, refineries, coke and gas works, and great commercial industries, in a state with unsurpassed fuel resources is a natural center for the advanced training of those whose affiliation with industry has already demonstrated the need of a better fundamental understanding of our fuel resources and a clearer conception of their proper development and utilization.

TECHNICAL SECTION
WALTER C. BECKJORD, Chairman HARRY E. BATES, Vice-Chairman
H. W. HARTMAN, Secretary

Comprehensive Program Planned for First Production Conference

By R. G. PORTER
Chairman, Joint Committee on Production Conference

THE Program Committee for the first Production Conference has initiated plans for a program which promises to be the most complete and informative discussion of production activities yet sponsored by the American Gas Association.

The Conference is to be held at the Book Cadillac Hotel, Detroit, Michigan, on May 31 and June 1, 1927, and will consist of four sessions, two morning and two afternoon sessions. From the interest already shown by the members, it is anticipated that a most representative gathering of production engineers will be present.

The Program Committee has included in its plans all of the major problems which are confronting production engineers today, and as a basis for presenting the latest developments in these problems, has sent to a representative group of engineers the questionnaire that is reproduced below.

While the arrangements for the final program are not entirely complete, it has been decided to alternate summaries affecting coal gas operation with water gas operation, and to include in addition to the summaries presented, one or more of the following papers, which have been obtained through the courtesy of A. C. Fieldner, of the Bureau of Mines:

The reactivity of coke with carbon dioxide, water vapor in air, at various temperatures with notes on degree of reactivity with time of exposure.

The burning properties of high and low temperature cokes in domestic furnaces.

Clinker formation in water gas generators.

Relation of fusibility of ash in coal and coke to the formation of clinker.

"The Evaluation of Gas Oil," to be prepared by H. Vittinghoff, or some member of his organization.

In addition to the above papers, the folowing summaries will probably be presented: 1. Clinker formation in water gas generators. 2. Soft coal operation. 3. Gas oil. 4. Steam accumulators. 5. Tar emulsions. 6. New devices in water gas manufacture. 7. Coal gas production, with particular regard to peak loads. 8. Coke. 9. By-product disposal. 10. Liquid versus oxide purification. 11. Inerts. 12. Waterless gas holders.

It may not be possible to include all of the above summaries in the time available, and the Program Committee reserves the right to select from the subjects listed those which are most pressing and interesting to the members.

It is suggested that members desiring to attend the Conference make their hotel reservations at an early date, addressing their reservation direct to William Hamilton, The Book Cadillac Hotel, Detroit, Mich. (March issue of MONTHLY erroneously referred to Cleveland as meeting place.)

The answers received to the question list which is being submitted to each member of the Carbonization and Water Gas Committees are to be used as a basis for preparing a summary of the experience and the thought for presentation at the Production Conference.

These summaries will be so prepared as not to disclose the source of any in-

formation received and no publication of the minutes of the conference will be made.

Sub-committee chairmen will prepare a brief digest covering the work of their committee and bring out special points of interest for the benefit of those attending this Conference.

Members are also invited and urged to suggest to Headquarters the names of any company or engineer not a member of these committees but who they feel would be particularly qualified to submit data on any of the questions. On receipt of these names duplicate list of questions will be forwarded from headquarters.

Any members desiring to participate in furnishing data on the questions included should direct their replies, in duplicate, to H. W. Hartman, Secretary, at Association Headquarters. The list is as follows:

DATA REQUIRED FOR JOINT PRODUCTION CONFERENCE

A. General Questions

1. What kind of gas do you manufacture?
   a. Coal Gas?
   b. Carburetted Water Gas?
   c. Blue Gas?
   d. Oil Gas?
2. What type of equipment do you use in the manufacture of your gas?
   Note: (If coal gas: horizontals, coke ovens, inclines, etc.?)
   (If water gas: size of sets, equipped with back run, type of automatic control, etc.?)
3. What B.t.u. standard must be maintained?

B. Questions Specifically Applying to Carburetted Water Gas Production

I CLINKER FORMATION IN WATER GAS GENERATORS, AND MEANS OF PREVENTION

1. What type of fuel is used? Give analysis of fuel in % fixed carbon, volatile matter, and ash. Give also the fusing point of ash.
2. What weight of clinker and ash is removed per ton of fuel fired?
3. What method is used in clinkering? Give description of tools used.
4. What effect has clinker formation on the type of refractory used for the generator wall.
5. What can you say of the use of special tile such as Bernitz bock and others, as a preventative for clinker adhesion?
6. What is done to drive the clinker down to the grates?
7. What has been your experience as to the cause of the formation of hard clinker? What was done to prevent this condition?
8. Does excess steam admitted a few runs prior to generator cleaning noticeably affect the cinker which has been formed?
9. What conditions determine when a generator should be cleaned?
10. How often is it necessary to remove side clinker? Give answer in terms of hours of operation, i.e., actual gas making hours.
11. How is side clinker removed?

II. SOFT COAL OPERATION

1. What are your specifications as to sizing of generator coal at the mines?
2. What per cent of fines is removed from coal as received from mines?
3. What system is used in handing coal from railroad cars or storage to generators?
4. What breakage occurs in the plant handling system?
5. Give results of a screening test of the fuel entering the generator.
6. How is the coal charged to the generators? And to what level in the generators is the fuel charged?
7. How often are generators charged?
8. What is the average weight of the charge?
9. How is "arching over" or "bridging" in the generators overcome?
10. How are blow holes treated?
11. What is the normal appearance of the generator fire just prior to coaling?
12. Is the fuel bed leveled off prior to every charge? If so, why?
13. What blast pressure is normally maintained under the grates?
14. How much air is used per M cubic feet of gas produced?
    a. generator air? b. carburetter air?
15. Is the carburetter air valve opened simultaneously with the stack? Explain your reasons for your practice.
16. How is smoke production minimized?
17. What percentage of the fuel charged is reclaimed as blown over material from the carburetter, superheater and dust traps?
18. How many pounds of fuel are removed from stack dust collectors per ton of generator coal fired?
19. How much steam per M cubic feet of gas produced is used?
20. Has it been found necessary to use more steam per M with coal than was necessary with coke? If so, how do you account for this?
21. What operating cycle is used? Give the various steps in both per cent and seconds.
22. What spacing is used for carburetter checker brick, and how are they placed; i.e., straight, spiral or staggered flues?
    a. How many courses? b. Size of brick?
23. Give the above information also on superheater checkering.
24. What temperature do you normally maintain at the base of the superheater? At exactly what point is this temperature taken?
25. Do you use coke for bringing machines up to heat?
26. Have explosions occurred in the set during the ,starting-up period? If so, what was the apparent cause?

27. How often are fires cleaned?
28. Give number of man hours required for clinkering per million cubic feet of gas produced.
29. What per cent of the fuel fired is reclaimed from the generator cleaning?
30. What is the per cent of combustible in the ash?
31. What credit is given to the fuel as charged for the material reclaimed?
32. What disposition is made of the reclaimed combustible material?
33. How much tar is produced, and how does this compare with coke operation? Give answer in per cent of total oil carburetted.
34. Give average analysis of blast gases.
35. What is the B.t.u. of the blue gas?
    Up run .....
    Back run .....
36. Give analysis of blue gas.
    On the up run .....
    On the back run or down run .....
37. How much cyanogen in the gas at the outlet of the condensing system? Give answer in grs. per hundred cubic feet.
38. Give average operating results over one month's period, that is B.t.u. of finished gas, fuel per M, oil per M, steam per M, and oil efficiency in B.t.u. per gallon, calculated according to the formula.

$$\frac{(19.5 \times \text{Ga. Oil/M}) + (\text{B.t.u. of finished Gas} - 300)}{\text{Gal. Oil/M}} = \text{B.t.u./Gal.}$$

39. From what type of set, that is straight run, back run, reverse blast, or pier equipped, was the above data taken? What is the size of the set?

III. Gas Oil

1. a. What grades of gas oil have you used? Give characteristic analysis of each grade.
   b. How is each grade received and unloaded? What method is used to heat the heavier materials prior to unloading?
2. What type pumps have been found most satisfactory for handling the heavy oils?
3. Is it necessary to heat the material in the tank during cold weather?
4. What type strainer is used in the line between storage and the water gas sets?
5. What type of meter is used?
6. What pressure is the meter subject to?
7. Have meter casting failures been experienced?
8. What was done to remedy the failure troubles?
9. What type of oil spray is used?
10. Are oil spray muzzle sizes changed when heavy oil is used?
11. Is it found necessary to purge sprays with steam with all types of oil used?
12. What size carburetter is used?
13. How many courses of checker brick in the carburetter? What size of brick?
14. What is the spacing of the brick?
15. Are flues straight, spiral or staggered?
16. What is the life of the surface checkers?
17. Is this life decreased when heavy oil is used? If so, how much?
18. Is entire checker renewal required more frequently with heavy oil?
19. Have any recent experiments been made with checkerless carburetters on various grades of oil?
20. What temperature changes have you found necessary in the set with the various types of oil carburetted?
21. Is oil preheated? If so, to what degree?
22. What type of preheater is used?
23. What increase in efficiency is noted when oil is preheated?

IV. Steam Accumulators

1. Describe briefly the installation you have, giving rated capacity, dimensions, and number and size of water gas sets supplied.
2. What actual saving has resulted from the installation of the accumulator? Give in pounds and percentage in terms of boiler fuel or steam made.
3. Is it necessary for best efficiency that accumulator be so connected that all of the exhaust steam used goes through it.
4. Where single water gas sets are supplied have you found any advantage in supplying make up steam direct to set? Has such a connection permitted operating accumulator at lower pressures?
5. Should the make up steam be supplied so as to pass through the accumulator?
6. Do you use your accumulator for boiler feed water heating also and as treating tank in the softening of boiler feed water?
7. Where accumulator is used for boiler feed water heating, how is the removal of oil from dirty exhaust steam taken care of?
8. What effect has the deposited oil from dirty exhaust steam on the operation of the accumulator?

V. Tar Emulsions

1. Have you been troubled with the formation of tar emulsions?
2. From your experience, what can you say as to the cause of tar emulsions?
3. Have you successfully prevented the formation of emulsions? If so, by what method?
4. What have you found to be the most effective method of breaking up emulsion?
5. Have you tried
   a. the impact method?
   b. centrifugal method?
   c. chemical treatment?
   d. distillation method?
   If so, with what results?
6. What percent of water in your emulsion?
7. What percent of water in your dehydrated tar?
8. Have you found any satisfactory means of disposing of tar emulsions without breaking them up?

VI. New Devices in Water Gas Manufacture

1. What results have been experienced with automatic thermal control?

2. What experience have you had with automatic volume control of air, steam and oil in water gas sets?
   a. What in your opinion are the advantages of such control?
3. What experience have you had with automatic charging and clinkering? What in your opinion is the importance of such devices?
4. What experience have you had with fuel reclaiming devices? State whether in your opinion they are practical.
5. State experiences you have had with new devices other than those mentioned above.

C. Data Applying More Specifically to Carbonization or to Combination Coal and Water Gas Plants

I. COAL GAS PRODUCTION

1. What do you feel is the truly economic method for producing base load and peak load gas assuming you were building a new plant?
2. What are you using for base load and peak load gas and how produced?
3. What percent of base load is your peak load?
4. How do you define your base load and peak load?
5. If you have only coal gas equipment how do you meet peak load requirements?
6. What do you feel is the possibility of complete gasification reaching a point of application to the gas industry?
7. What in your opinion will be the trend of future methods of gas manufacture?
8. Is breeze used to better advantage in producers or under boilers?
9. Do you use attached or detached producers?
   a. What type or make?
   b. What fuel do you use in your producers?

II. COKE

1. What qualities of coke should be controlled in the manufacture and preparation for domestic market?
2. How far is it possible for a given plant to control each quality?
3. Which qualities of coke are controlled by the quality and type of coal?
4. Which qualities of coke are controlled by the plant equipment?
5. Which qualities of coke are controlled by method of operation?
6. What control tests are advisable?
7. How do you quench your coke? If you use dry quenching what economies and what benefits result?
8. If you carbonize in retorts rather than in ovens, what type do you use, and what results have you obtained by mixing of coals as to character of resultant coke?
9. What type of screen have you found most satisfactory?
10. In what sizes do you prepare coke for sale? How do you designate these sizes?
11. What method is used for loading railroad cars with coke for sale?
12. What method is used for loading trucks with coke for sale?
13. What disposition is made of breeze and how is it handled?
14. How do you prepare coke for stock? Do you screen before stocking?
15. What method is used for recovering coke from stock?
16. What breakage results from stocking and reclaiming coke?
17. What is the cost per ton to stock and reclaim coke?

III. MISCELLANEOUS

1. In what form do you sell your ammonia?
   a. At what price?
   b. What is your yearly production?
2. If you remove napthalene by some scrubbing process
   a. How many grains in scrubbed gas?
   b. What is cost per M including investment cost?
   c. What kind of equipment do you use?
3. Do you scrub your coal gas for light oil?
   a. If so, what type of carbonizing equipment produces your gas?
   b. What is the B.t.u. of your gas before and after scrubbing?
4. Are your boilers equipped with stokers?
   a. If so, what kind?
   b. If so, what different fuels have you used?

D. Questions Applicable to all Types of Plants.

I. LIQUID vs. OXIDE PURIFICATION

1. What is the difference in cost of oxide purification and liquid purification per M cubic feet of gas purified?
2. What is the difference in man hours of labor required per million cubic feet of gas purified for oxide and liquid purification?
3. What advantages may be claimed for liquid purification in the way of removal of traces of tar oil, cyanogen, and other constituents undesirable from the distribution standpoint, which tend to justify any greater cost?
4. What percent above rated capacity is possible, and over what period of time has this overload been carried?
   Oxide Purification.....
   Liquid Purification.....
5. Which system can be more readily adjusted?
   a. to meet change of load, and
   b. meet peak load conditions?

II. INERTS

1. What B.t.u. standard must be maintained?
2. What percent of inerts in the gas is considered economical from standpoint of cost of manufacture?
3. What is the largest percentage of inerts in the finished gas which is economically desirable from the Gas Company's standpoint having in mind not only the cost of gas but also delivery up to the customer's burner?
4. What is your method of controlling the percentage of inerts in the gas?

(Continued on page 254)

Industrial Burner Ports

(Continued from page 230)

(1) may be written, taking due account for the change in density:

$$\frac{6Q}{60} = \frac{39.24}{\sqrt{.89}} \sqrt{\frac{(ch)\ d^5}{L_3}}$$

Since $a + b + c = 1$, the expression may be written:

$$\left(\frac{5Q}{60 \times 39.24}\right)^2 \times \frac{L_1}{hd^5} + \frac{1728}{62.5} \times \frac{.07493}{144} \times \frac{.2}{h64.4} \left(\frac{5Q}{3600} \times \frac{4 \times 144}{(.667d)^2 \pi}\right)^2 + \left(\frac{6Q \times \sqrt{.89}}{60 \times 39.24}\right)^2 \times \frac{L_2}{d^5 h} = 1.$$

$$\frac{.00000451Q^2L_1}{hd^5} + \frac{.0000147Q^2}{hd^4} + \frac{.00000578Q^2L_2}{hd^5} = 1.$$

It is safe to assume for ordinary practice that $L_2 = .2L_1$. Then

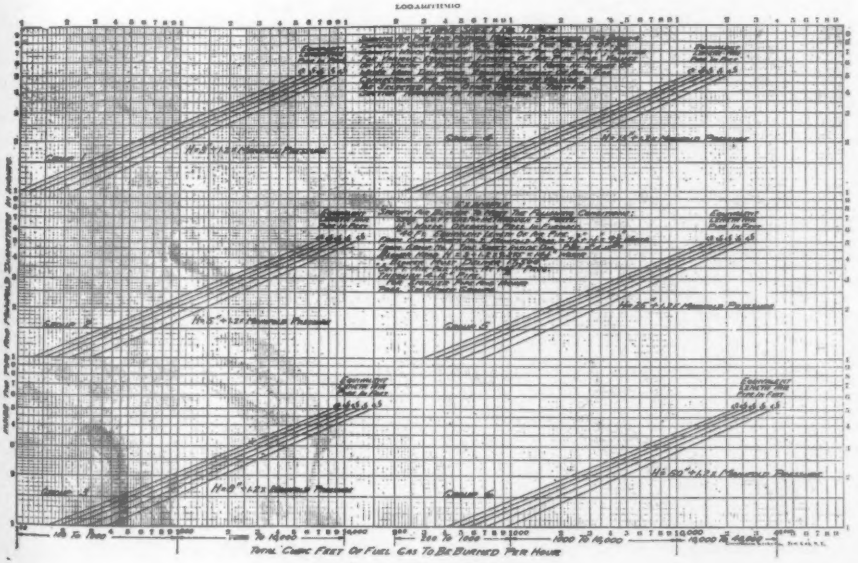
$$\frac{.00000451Q^2L_1}{hd^5} + \frac{.0000147Q^2}{hd^4} + \frac{.000001156Q^2L_1}{hd^5} = 1.$$

$$Q^2 = \frac{176{,}500\ hd^5}{L_1 + 2.59d}$$

This is a convenient formula for application to the solution of any ordinary problem in pipe sizes for small industrial jobs. Curve sheet No. 3 was prepared from this equation for values of h equal to 3″, 5″, 8″, 15″, 25″, and 50″; and values of L_1 equal to 7.5 ft., 15 ft., 25 ft., 35 ft., and 50 ft.

For co-ordination with curve sheet 2, the initial air head H in inches of water is shown by each group of curves, in an equation of the form $H = h + \frac{6}{5}$ manifold pressure. This expresses necessary blower delivery head directly, and takes into account the fact that this must be great enough to carry operating manifold head and also permit the fuel gas to be induced at atmospheric pressure. In order to prevent manifold pressure being reduced 1/6 by introduction of zero gas, it is necessary to raise air pressure 1/5.

For practical purposes, it is not necessary to compute velocity head at blower



Curve Sheet Three

outlet or in manifold. If head readings are measured with a water manometer perpendicular to flow, then the fact that there is a small velocity head only amounts to a slight factor of safety.

An example will illustrate the use of curve sheet 3. Suppose it is desired to specify an air blower with a reasonable minimum outlet delivery pressure to provide for consumption of 3,500 cu.ft. of gas per hour through five burner ports on one furnace having an operating pressure of about $+1\frac{1}{2}$ inches water. Equivalent length of air line to be 40 feet.

Total gas consumption, cu.ft. per hour	3,500
Gas consumption through each port	700
Total air volume necessary, cu.ft. per hour	17,500

From Curve Two:

Port size necessary, inches diameter each	1-5/32
Total manifold pressure, including furnace back pressure, in. H_2O	9-3/8

From Curve Three, group 1:

Air and mixture inside pipe diameter in inches	4.15
Total blower head H, in inches of water $= 3 + 1.2 \times 9.375 =$	14.25

From Curve Three, group 2:

Air mixture inside pipe diameter in inches	3.7
Total blower head H, in inches water $= 5 + 1.2 \times 9.375 =$	16.25

From Curve Three, other groups similarly:

If standard wrought iron pipe were to be used to fulfill the above specifications, reference to pipe table shows that the inside diameter of 4" pipe is 4.026" and consequently the above operating delivery pressure would be rounded off to 15 inches water. The blower specified should deliver 17,500 cu.ft. of air per hour at outlet head of 15 in. of water, and have connection to fit 4" pipe. For convenience, a synopsis of the above example is included on page 225.

THE Ruud Manufacturing Company, Pittsburgh, Pa., has announced that Ruud water heaters sold in the British Isles will henceforth be manufactured in a new factory in London, England. The company now has factories located at Pittsburgh, Pa.; Toronto, Ont.; Hamburg, Germany, and London.

Brooklyn Union Show

A TRIP around the world was the unusual treat offered those who attended the annual show of The Brooklyn Union Gas Club on February 22. The musical play, entitled "Black Diamonds," was written and directed by William Smith. The cast consisted of 150 employees of The Brooklyn Union Gas Company.

Production Conference

(Continued from page 252)

5. What amount of inerts do you obtain in your gas when meeting peak requirements and what increase is this amount over that of your base load gas?
6. What is your method of controlling the gravity of the gas, and over what range do you permit its variation?
7. How does the specific gravity of your gas vary? Give maximum and minimum. Also give normal variation.

III. Waterless Gas Holders

1. What material is used for piston seals?
2. What method is used to remove the accumulated water from this material?
3. Has any difficulty been encountered with the automatic piston seal level apparatus?
4. What difficulties are encountered with freezing of tar and equalizer lines, and how were they overcome?
5. What is the capacity of the holder?
6. What amount of gas is handled per 24 hours in the holder?
7. Is the holder equipped with hoists?
8. What method is used for indicating the piston level in the holder?
9. What safety precautions are taken when it is necessary for men to work above this piston in the holder?
10. Give the comparison of cost of heating waterless and ordinary lift holders.
11. Have you had any failures of the canvas on the piston?
12. How many man hours per day are required for holder inspection and operation?
13. What precaution is used to guard against insufficient supply of sealing liquor in the piston cup?
14. Where is seal liquor sampled for H_2O content?
15. What can be said of the waterless gas holder as an aid in the dehydration of gas?

IV. Production Records

1. What plant production records are made?
2. Submit sample form of each with brief description explaining its use.

Associations Affiliated with A. G. A.

K. R. Boyes, Secretary

Canadian Gas Association
Pres.—J. J. Armstrong, Consumers Gas Co., Toronto, Ont.
Sec.-Tr.—G. W. Allen, 7 Astley Avenue, Toronto.
Conv., Toronto, Ont., June 16 & 17, 1927.

Empire State Gas and Electric Association
Pres.—H. M. Brundage, Consolidated Gas Co. of New York, New York, N. Y.
Chairman Gas Section—J. E. Cooper, Utica Gas & Electric Co., Utica, N. Y.
Sec.—C. H. B. Chapin, Grand Central Terminal, New York, N. Y.
Conv., Lake Placid Club, Lake Placid, N. Y., Oct. 6 & 7, 1927.

Illinois Gas Association
Pres.—P. D. Warren, The Peoples Gas Light & Coke Co., Chicago, Ill.
Sec.-Tr.—R. V. Prather, 305 Illinois Mine Workers Bldg., Springfield, Ill.
Conv., 1928.

Indiana Public Utility Association—Gas Section
Pres.—E. Van Arsdel, 1100 J. F. Wild Bldg., Indianapolis, Ind.
Sec.-Tr.—E. J. Burke, Room 1270, Peoples Gas Bldg., Chicago, Ill.
Conv., French Lick Springs Hotel, French Lick, Ind., May 19, 20, 21, 1927.

Michigan Gas Association
Pres.—C. R. Henderson, Washtenaw Gas Co., Ann Arbor, Mich.
Sec.-Tr.—A. G. Schroeder, Grand Rapids Gas Light Co., Grand Rapids, Mich.
Conv., Grand Hotel, Mackinac Island, Mich., July 5, 6, 7, 1927.

Mid West Gas Association
Pres.—Frank S. Edge, Peoples Light & Fuel Co., Grinnell, Iowa.
Sec.-Tr.—H. R. Sterrett, 551 Seventh St., Des Moines, Ia.
Conv., St. Paul Hotel, St. Paul, Minn., April 21 & 22, 1927.

Missouri Association of Public Utilities
Pres.—F. S. Dewey, Kansas City Power and Light Co., Kansas City, Mo.
Sec.-Tr.—F. D. Beardslee, 315 N. 12th St., St. Louis, Mo.
Conv., Cape Girardeau, Mo., May 5, 6, 7, 1927.

New England Gas Association
Pres.—William Gould, Gas and Electric Improvement Co., Boston, Mass.
Acting Secretary—E. A. Taylor, 100 Weybosset St., Providence, R. I.
Chairman Operating Div.—A. H. Scott, New Britain Gas Light Co., New Britain, Conn.
Secretary Operating Div.—F. E. Drake, Lynn Gas & Electric Co., Lynn, Mass.
Pres. Sales Div.—M. B. Webber, Marlboro-Hudson Gas Co., Boston, Mass.
Sec.-Tr. Sales Div.—J. H. Sumner, 719 Massachusetts Ave., Cambridge, Mass.
Pres. Industrial Div.—R. J. Phelon, Worcester Gas Light Co., Worcester, Mass.
Sec.-Tr. Industrial Div.—J. J. Winn, Jr., Fall River Gas Works Co., Fall River, Mass.
Conv., 1928.

New Jersey Gas Association
Pres.—L. N. Yetter, Atlantic City Gas Co., Atlantic City, N. J.
Sec.-Tr.—Louis Stoecker, Public Service Electric & Gas Co., Newark, N. J.
Conv., Bellevue-Stratford Hotel, Philadelphia, Pa., April 7, 1927.

Oklahoma Utilities Association
Pres.—E. R. Ernsberger, Southwestern Light & Power Co., Oklahoma City, Okla.
Mgr.—E. F. McKay, Oklahoma City, Okla.
Conv., second week March, 1928.

Pacific Coast Gas Association
Pres.—W. S. Yard, Pacific Gas & Electric Co., San Francisco, Calif.
Exec. Sec.—Clifford Johnstone, 447 Sutter St., San Francisco, Calif.
Conv., Santa Cruz, Calif., Sept., 1927.

Pennsylvania Gas Association
Pres.—Allyn C. Taylor, Consumers Gas Co., Reading, Pa.
Sec.-Tr.—Geo. L. Cullen, Harrisburg Gas Co., Harrisburg, Pa.
Conv., Bellevue-Stratford Hotel, Philadelphia, Pa., April 6, 1927.

Southern Gas Association
Pres.—A. E. Merchant, New Orleans Public Service, Inc., New Orleans, La.
Sec.-Tr.—J. P. Connolly, 141 Meeting St., Charleston, S. C.
Conv., Biltmore Hotel, Atlanta, Ga., April 19, 20, 21, & 22, 1927.

Southwestern Public Service Association
Pres.—H. E. Borton, Mineral Wells Electric Co., Dallas, Texas.
Chairman Gas Section—C. K. Fletcher, Fort Worth Gas Co., Fort Worth, Texas.
Sec.—E. N. Willis, 403 Slaughter Bldg., Dallas, Texas.
Conv., Hotel Roosevelt, New Orleans, La., April 26-29, 1927.

Wisconsin Utilities Association
Pres.—John St. John, Madison Gas & Electric Co., Madison, Wisc.
Exec.-Sec.—J. N. Cadby, 445 Washington Bldg., Madison, Wisc.
Conv., 1927.

Geographic Divisions

Eastern States Gas Conference
Pres.—S. P. Curtis, American Gas Co., Philadelphia, Pa.
Sec.-Tr.—J. C. Smith, Consumers Gas Co., Reading, Pa.
Conv., Bellevue-Stratford Hotel, Philadelphia, Pa., April 7 & 8, 1927.

Ninth Annual Convention of the American Gas Association
Chicago, Ill. Stevens Hotel Oct. 10-14, 1927

Employment Bureau

(Address All Communications to Key Number)

SERVICES REQUIRED

WANTED by large gas company in middle west, salesman for industrial gas appliances. Address A. G. A.
Key No. 073.

WANTED—A fast growing Gas Syndicate operating a number of Gas Companies desires the services of an experienced gas appliance solicitor. Only trained and experienced men with good references need apply. A good opportunity for a live, wide-awake salesman. Address A. G. A.
Key No. 079.

SALESMEN—Large Public Utility Company operating in Central New York and many other states, desires to employ several securities salesmen to sell company securities. Excellent opportunity. State salary, age, experience, married or single. Address A. G. A.
Key No. 080.

INDUSTRIAL GAS SALES REPRESENTATIVE: Gas company in a Middle Atlantic State has an opening for a technical college graduate, with fundamental knowledge of application and combustion of various fuels, to sell gas for industrial uses. Must be capable of making plant surveys of heat applications. State age, education, experience and salary desired. Address A. G. A.
Key No. 085.

SALESMAN—Chiefly for gas-fired steam radiators, also other gas appliances to work in New York City. One acquainted with plumbing and heating trade preferred. Salary and commission basis. Address A. G. A.
Key No. 094.

A PROGRESSIVE Gas Company in Mass. has an opening in its Industrial Gas Engineering Department for a Technical College Graduate to sell gas for industrial uses. State age, education, experience, and salary desired. A fine opportunity for the right young man. Address A. G. A.
Key No. 095.

SHOP FOREMAN—Wanted by Company operating in the Metropolitan District of New York City. 25,000 Meters. Must be thoroughly familiar with all classes of work on consumers' premises, industrial appliances, routing and transportation. Give age, experience and compensation desired. References will be considered confidential if requested. Address A. G. A.
Key No. 097.

INDUSTRIAL GAS ENGINEER wanted by large gas company operating in middle west. Write, giving age, experience, and qualifications. An opportunity for the right man. Address A. G. A.
Key No. 0100.

WANTED—A SALES ENGINEER for the industrial use of gas. Must be an engineer with sufficient technical knowledge and experience with gas fuel to make the necessary calculations for the design or adaptation of furnaces to use gas as a fuel. Must also have the energy, persistance and tact necessary for this. Salary $300.00 per month; location, Virginia. Submit record and references with application. Arrangement will be made for personal interview with those whose records indicate suitability for this position. Address A. G. A.
Key No. 0102.

SERVICES OFFERED

WANTED—Position as Gas Engineer or Superintendent of property serving 30,000 or more meters. Fifteen years' experience in high and low pressure distribution, coal and water gas production. Address A. G. A.
Key No. 211.

TECHNICAL MAN now employed as superintendent and industrial gas engineer desires new location. Thirty-six years of age. Fourteen years' experience in coal and water gas manufacture, sales and distribution. Services available upon reasonable notice to present employer. Address A. G. A.
Key No. 217.

AGGRESSIVE COMMERCIAL MANAGER—34 years of age, available October or November. Thoroughly familiar, Industrial, Commercial and Domestic Sales Promotion. Address A. G. A.
Key No. 220.

ACCOUNTANT and Office Manager with wide experience in management, purchasing and all office details. Address A. G. A.
Key No. 223.

POSITION wanted as Superintendent of small gas company or as General Foreman of large plant. Approximately seventeen years' experience in all branches of manufacture and distribution, high and low pressure systems. Address A. G. A.
Key No. 224.

A MAN 31 years of age and married seeks admission in the Gas or an affiliated industry on possession of the following qualifications. A knowledge of the fundamentals of Gas making. A quite thorough theoretical and practical knowledge of Combustion. A close aquaintance among the officials of a majority of the Central Stations of the East. A background of eight years' experience in Sales Management and Supervision in both the Wholesale and Retail Coal Business. One year's experience in the management of the Sales Distribution and Installation work of an Oil Burner. A natural leaning toward legitimate promotion and its accompanying contact work. Desirable references as to Character, Personality and Ability. Address A. G. A.
Key No. 225.

POSITION as manager of small gas or combination gas and electric property or as commercial manager of a larger property by a man thoroughly reliable with wide experience and a record for producing results. Address A. G. A.
Key No. 226.

CHEMICAL ENGINEER—with 7 years' experience in the testing and developing of different classes of gas appliances also familiar with the testing and utilization of natural gas and manufactured gas—A-1 references. Address A. G. A.
Key No. 227.

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Secretary	C. W. PERSON	Ass'n Headqtrs.
COMMERCIAL—Chairman	J. J. BURNS	St. Louis, Mo.
Vice-Chairman	G. M. KARSHNER	New York, N. Y.
Secretary	J. W. WEST, Jr.	Ass'n Headqtrs.
INDUSTRIAL GAS—Chairman	H. O. LOEBELL	New York, N. Y.
Vice-Chairman	F. C. MACKEY	Chicago, Ill.
Secretary	C. W. BERGHORN	Ass'n Headqtrs.
MANUFACTURERS—Chairman	W. E. STEINWEDELL	Cleveland, O.
Vice-Chairman	H. L. WHITELAW	New York, N. Y.
Secretary	C. W. BERGHORN	Ass'n Headqtrs.
TECHNICAL—Chairman	W. C. BECKJORD	New York, N. Y.
Vice-Chairman	H. E. BATES	Chicago, Ill.
Secretary	H. W. HARTMAN	Ass'n Headqtrs.

MANAGING DIRECTOR	ALEXANDER FORWARD	Ass'n Headqtrs.
ASSISTANT MANAGER	H. W. HARTMAN	Ass'n Headqtrs.
SECRETARY	K. R. BOYES	Ass'n Headqtrs.